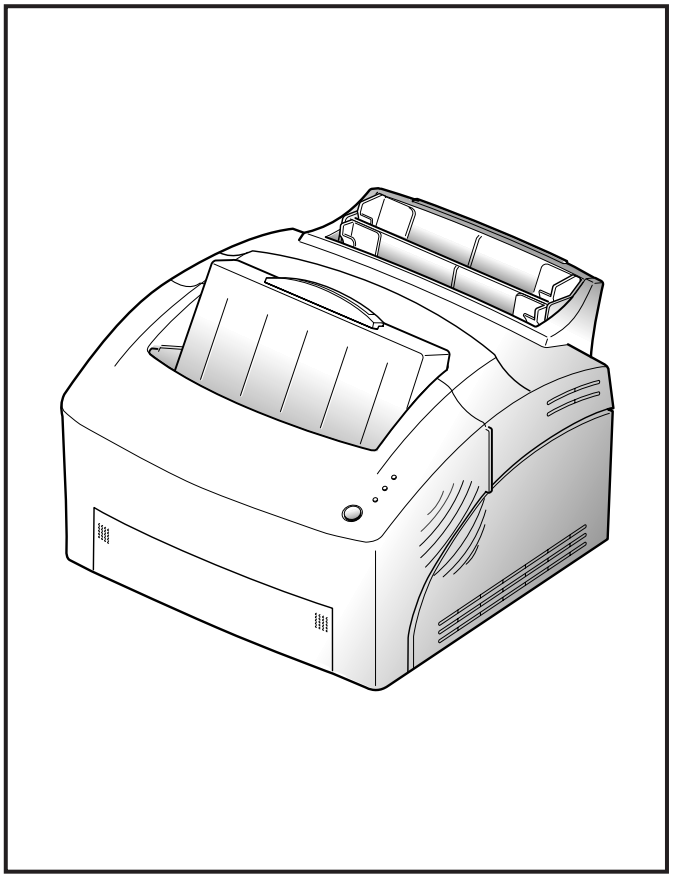
SAMSUNG

LASER PRINTER

ML-5000A

SERVICE *Manual*

LASER PRINTER



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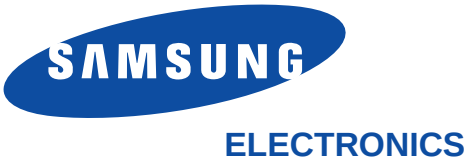

ELECTRONICS

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1. Precautions

1-1 Safety Precautions

Read each caution carefully:

1. Do not use this printer near water or when exposed to inclement weather.
2. Do not place this printer on an unstable cart, stand or table; the product may fall, causing serious damage to the product.
3. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation and to protect the printer from everheating, do not block or cover any of these openings. Do not place the printer in an enclosure unless the enclosure provides adequate ventilation.
4. Never push objects of any kind into the printer through the cabinet ventilation slots as they may touch dangerous high voltage points, create short circuits, cause a fire, or produce an electrical shock. Never spill liquid of any kind on the printer.
5. Do not place the printer in a location where someone may trip on the cords.
6. Select a work surface that is large enough to hold the printer.
7. Position the printer within six feet of the computer and within five feet of an electrical outlet.
8. Operate this printer using the power source (110V, 220V, etc) indicated on the marking label. If you are not sure of the type of power source available, consult your dealer or local power company.
9. If you need to use an extension power cord with this printer, make sure that it uses a three-wire grounded cord and that the total ampere ratings for all of the products using the extension do not exceed the extension cord ampere rating. Also, make sure that the total of all products plugged into the wall outlet does not exceed 15 amperes.
10. Do not allow anything to rest on the power cord or data communications cable.
11. Unplug this printer from the wall outlet before cleaning. Do not use liquid cleaners or aerosol sprays. Use a damp cloth for cleaning.
12. Do not touch the surface of the photo-sensitive drum as marks or scratches may impair print quality.
13. Do not expose the drum unit to direct light for prolonged periods.
14. Use only standard papers, OHP films, and approved envelopes. Feed OHP films though the manual feed slot only. See specifications for approved papers and envelopes.
15. Other than replacing consumables such as paper and toner, refer all questions to qualified service personnel.

WARNING :

NEVER OPERATE AND SERVICE THE PRINTER WITH THE PROTECTIVE COVER REMOVED FROM LASER/SCANNER ASSEMBLY. THE REFLECTIVE BEAM, ALTHOUGH INVISIBLE, CAN DAMAGE YOUR EYES.

1-2 Servicing Precautions

Note :

Requirements for AC power are described on the label affixed to the rear of the printer. Check the AC voltage rating requirement before use.

1. Before disassembly, pull the power plug from the AC power connector.
2. To avoid spilling toner inside the machine, do not turn the printer over or on its side before removing the developer cartridge.
3. Faulty installation of DRAMs may cause permanent damage to the Laser Printer.
4. Use only+5V power for video controller-related circuitry.
5. When replacing parts, use only the same type of part as the original. Replacing components with a second vendor's part may cause faulty operation.
6. Check the insulation between the blades of the AC plug and accessible conductive parts (examples : metal panels and input ports).
7. **Insulation Checking Procedure:**
   Disconnect the power cord from the AC power source. Connect an insulation resistance meter (500V) to the blades of the AC plug.

   The insulation resistance between each blade of the AC plug and accessible conductive parts (see left) should be greater than 1 megaohm.
8. Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.
9. Always connect a test instrument's ground lead to the instrument chassis ground before connecting the positive lead; always remove the instrument's ground lead last.

1-3 ESD Precautions

Some semiconductor ("solid state") devices are easily damaged from static electricity. Such components commonly are called Electrostatically Sensitive Devices (ESDs); examples include integrated circuits (ICs), Large-Scale Integrated circuits (LSIs), some field-effect transistors, and semiconductor chip components. The following techniques will reduce the occurrence of component damage caused by static electricity:

CAUTION : Be sure the power is off to the chassis or circuit board, and observe all other safety precautions

1. Immediately before handling any semiconductor components assemblies, drain the electrostatic charge from your body by touching a known earth ground. Alternatively, wear a discharging wrist strap device. (Be sure to remove the strap before applying power to the unit under test to avoid potential shock.)
2. After removing ESD-equipped assembly, place it on a conductive surface such as aluminum foil to prevent accumulation of an electrostatic charge.
3. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ESDs.
4. Use only a ground-tip soldering iron when soldering or desoldering ESDs.
5. Use only anti-static solder removal device. Some solder removal devices are not rated as "anti-static;"these can accumulate sufficient electrical charge to damage ESDs.
6. Do not remove a replacement ESD from its protective package until you are ready to install it. Most replacement ESDs are package with leads that are electrically shorted together by conductive foam, aluminum foil or other conductive materials.
7. Immediately before removing the protective material from the leads of a replacement ESD, touch the protective material to the chassis or circuit assembly into which the device will be installed.
8. Minimize body motions when handling unpackaged replacement ESDs. Motion such as your clothes brushing together, or lifting a foot from a carpeted floor can generate enough static electricity to damage an ESC.
9. Handle ICs and EPROMs carefully to avoid bending a pin.
10. Pay attention to the direction of parts when mounting or inserting them on a PCB.
11. Components can be permanently damaged if heated for longer than necessary while welding. All components are susceptible to heat damage.

2. Specifications

2-1 General

Emulation	PCL5e (ML-5000A), WPS (ML-5000G)
Interface (Parallel Port)	Centronics IEEE- P1284 compatible bi-directional (Nibble, Byte, ECP)
Print Speed	8 PPM (A4 Size, 5 % Character Pattern)
Print Method	Non-impact Electrophotography, Laser Beam
Resolution	600 X 600 DPI
Memory	Standard: 4 Mb (ML-5000A) / 1 Mb (ML-5000G) Expandable up to 36 Mb for ML-5000A only
Operating Environment	Temperature : 10 ~ 32.5 °C, Humidity: 20 ~ 80 % RH
Storage Environment	Temperature : -20 ~ 40 °C, Humidity: 10 ~ 95 % RH
Weight	Net : 7.5 kg (max.), Gross : 9.5 kg (max.)
Dimension	345 (W) X 364 (D) x 224 (H) mm
Certification & Compliance	CE, TUV, SEMKO, NEMKO, DEMKO, C-tick FCC, UL, CSA, CDRH, CB, EPA

2-2 Electrical

Input Voltage	AC 200~240 V ± 15 %, 50/60 Hz ± 3 Hz
DC Output Voltage	
Line Regulation	24 V ± 3 % 5 V ± 2 %
Load Regulation	24 V - 3 %/+10 % 5 V ± 3 %
Ripple Noise	24 V : 120 mV (Peak 400 mV) 5 V : 50 mV (Peak 100 mV)
Over Current Protect	24 V : 2.7 A ± 10 % (by C't) 5 V : 1.5 A ± 10 % (by C't)
Power Consumption	Max. 450 Wh Everage: 200 Wh Power Save Mode: 25 Wh
Warming Up Time	20 seconds or less
First Print Time	Idle mode : 20 seconds or less Power Save mode : 30 seconds or less
Acoustic Noise	Standby : 36 dB or less Sleep Mode: Background level Operating : 48 dB or less
Reliability	
Insulation Resistance	10 Mohm or less (at DC 500 V)
Dielectric Strength	AC 1500 V (DC 2100 V), 10 mA
Ground Continuous	0.1 ohm or less
Voltage DIP	Rated voltage ± 15 %
AC Impulse Noise	AC 1000 V 10, 100, 200, 400, 1000 ns
Leakage Current	3.5 mA or less
Surge	0.5 ~ 4 kV, 0.25 ~ 2 kA
Ozone Emission	0.1 ppm or less (8 hours)
Top Cover Open	Isolating the input power of the LSU, high voltage part, and fuser
Overcurrent Protect	Fuse inside the Engine Controller
Fusing System	
Trouble Sensing	The temperature doesn't rise to the specific temperature within a specific time. Fuser error occurs if the temperature is too high.
Overheat Sensing	240 ~ 250 °C (The thermostat cuts off the Fuser from the power.)
Thermistor Open Sensing	Without the initial temperature change of the Fuser
Source of Light	Laser Diode (LSU)
Developer	
Developing	Non-magnetic contact developing
Charging	Conductive roller charging
Density Adjustment	Dark, Medium
Transfer System	Pre-transfer by LED & conductive roller
Fusing System	Temperature & Pressure
Ozone Emission	0.1 PPM or less (8 hours)

2-3 Print Quality

Conditions	
Paper	Normal paper (75 g/m²)
Environment	Temperature : 20 ~ 25 °C, Humidity : 40 ~ 60 % RH
Print Quality	
Image Density	min. 1.3
Background	max. 1.0
Uniformity	max. 0.2 (including continuous print)
Fusing	min. 80 % (all black)
Start Position	Top : x ± 3 mm, Side : y ± 3 mm (from left)
Skew	Top : max. ± 1.5 mm/200 mm Side : max. ± 1.5 mm/250 mm
Orthogonality	± 1.0 mm
Horizontal Scan	± 0.6 mm/208 mm (Bowed Line Skew : S600,0909 pattern)
Special Paper Exception	Image Density : min. 1.0 (envelope) Fusing : min. 70 % (all black, envelope/OHP/postcard)
Paper Jam	1/2,000 or less
Paper Curl	First : 16 mm or less (10 sheets) After Cooling: 12 mm or less (10 sheets)

2-4 Option

Toner Cartridge	
Type	One-cartridge type
Life Span	Built-in toner cartridge : 5,000 pages at 5 % coverage (ML-5000A) 3,000 pages at 5 % coverage (ML-5000G) Optional toner cartridge: 5,000 pages at 5 % coverage Note: Its duration may last longer under Econo mode.
Memory (ML-5000A only)	Memory RAM: 2, 4, 16, 32 Mb (memory is expandable to 36 Mb) Note: Memory option is not available for ML-5000G.

2-5 Paper

Input Paper Size

Paper Type	Size	Feeding Source
A4	210 x 297 mm	Paper Tray or Manual feeder
Letter	216 x 279 mm	Paper Tray or Manual feeder
B5 (ISO)	176 x 250 mm	Paper Tray or Manual feeder
Executive	184 x 267 mm	Paper Tray or Manual feeder
Folio	216 x 330 mm	Paper Tray or Manual feeder
Legal	216 x 356 mm	Paper Tray or Manual feeder
Com-10 Envelope	105 x 241 mm	Manual feeder only
Monarch Envelope	98 x 191 mm	Manual feeder only
DL Envelope	110 x 220 mm	Manual feeder only
C5 Envelope	162 x 229 mm	Manual feeder only
C6 Envelope	114 x 162 mm	Manual feeder only
A5 Envelope	148 x 210 mm	Manual feeder only
Transparency	A4 or Letter	Manual feeder only
Label paper	A4 or Letter	Manual feeder only
*Others	Width: 75-216 mm, Length: 125-356 mm	Paper Tray or Manual feeder

*ML-5000A only

Feeding Source	Paper tray and manual feeder
Paper Weight	60 ~ 163 g/m^2
Input Paper Capacity	Paper tray: 150 sheets, Manual feeder : 1 sheet at a time
Paper Stacker Capacity	Face down : 100 sheets, Face up : 1 sheet
Paper Limitations	-Adhesive label sheets specifically designed for laser printers -Transparencies specifically designed for laser printers -Envelopes with peel-off adhesive strips or more than one fold-over flap to seal must have adhesive compatible with the heat and pressure of the printer's fusing process.
Unacceptable Papers	-Paper with embossed lettering, perforations, or rough texture -Paper with which color was added after the paper was made -Paper forms whose ink is not for laser printing

3. Disassembly and Reassembly

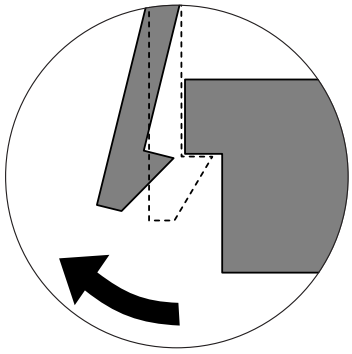
3-1 Removal Procedures

Cautions:

- Be sure to unplug the power cord whenever you are working on the printer with one of the covers removed.
- Be sure to remove the toner cartridge before you repair parts.

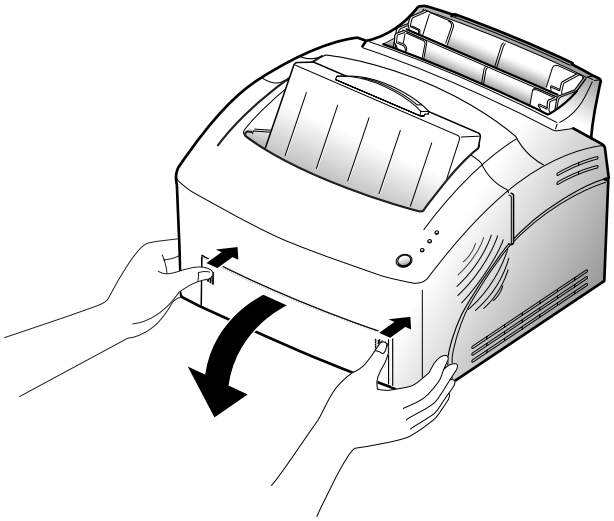
Releasing Plastic Latches

Many of the parts are held in places with plastic latches. The latches break easily; release them carefully. To remove such parts, press the hook end of the latch away from the part to which it is latched.

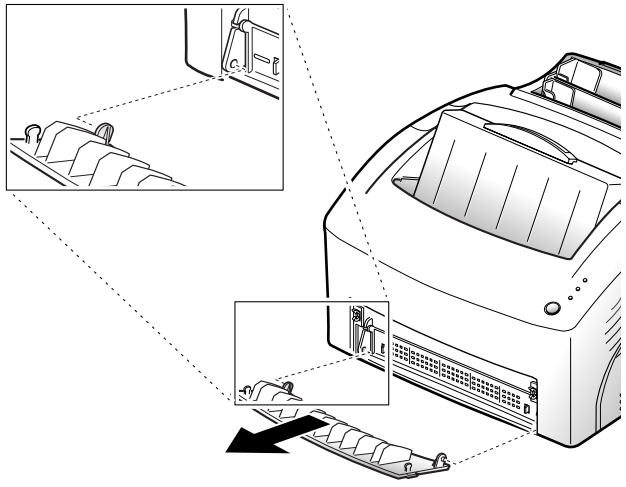


3-2 Face-Up Cover and Front Cover

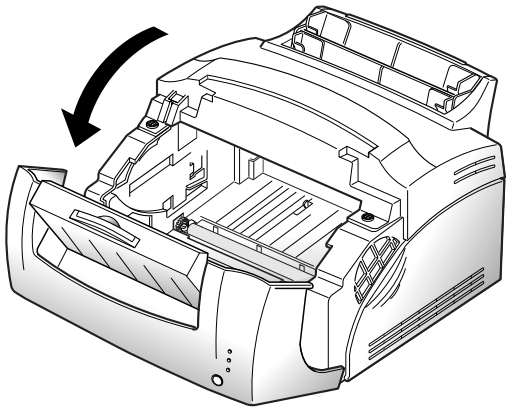
1. Place your fingers on both sides of the face-up cover, push the cover, and pull it down.



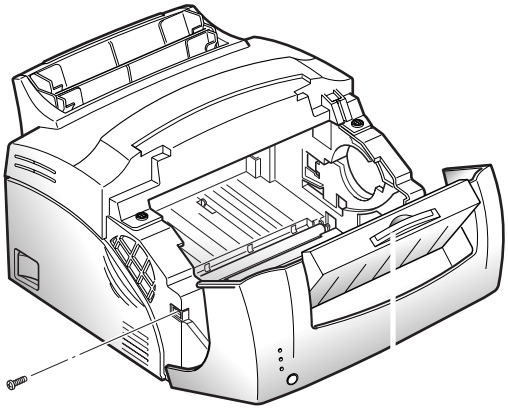
2. Bend the cover slightly to release the tabs at the end, then remove the cover.



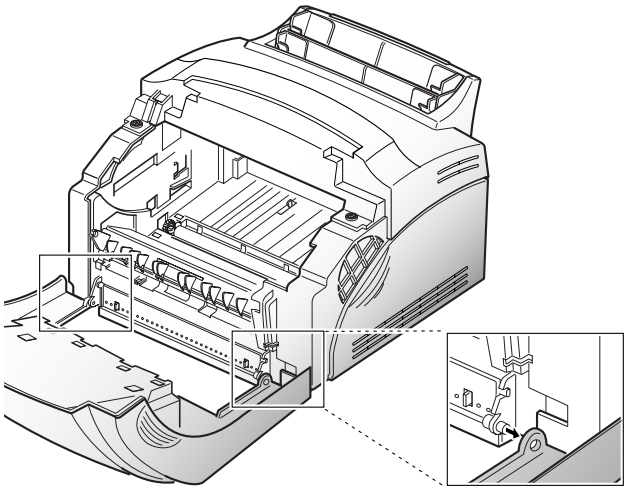
3. Open the front cover with hand.



4. Remove a screw securing the front cover to the main frame.



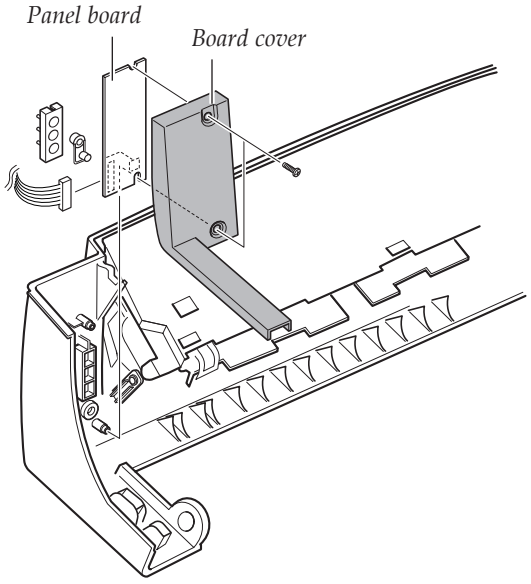
5. Unlatch the front cover, then remove the front cover.



3-3 Panel Board and Board Cover

1. Before you remove these parts, you should remove:
   -Face up cover and Front cover
   (see page 3-1)

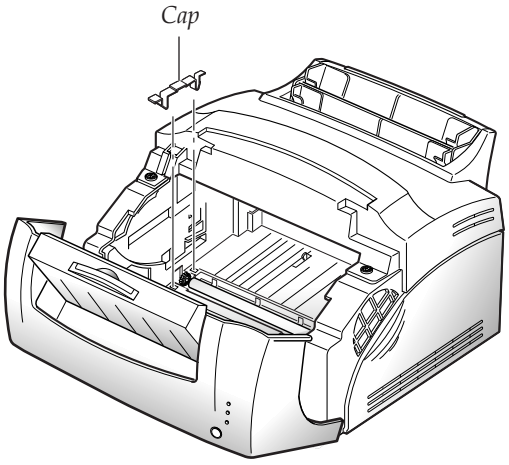
2. From the front cover, remove two screws, then remove the board cover.



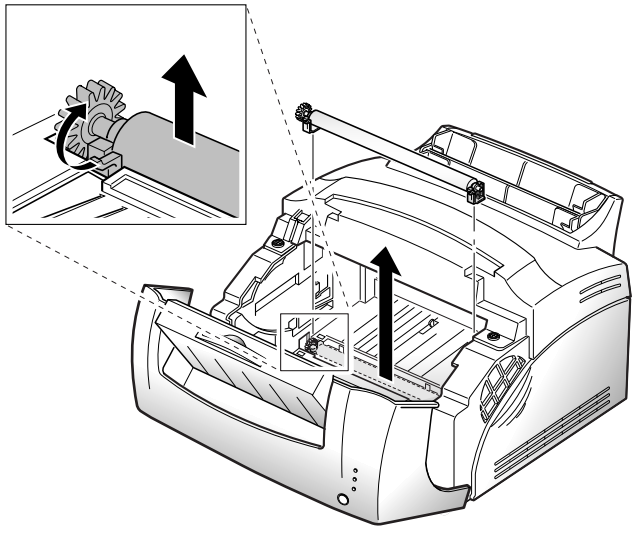
3-4 Transfer Roller

1. Open the front cover with hand.

2. Remove the transfer roller cap.



3. To remove the transfer roller, pull up the tab to release the roller, then take it out.

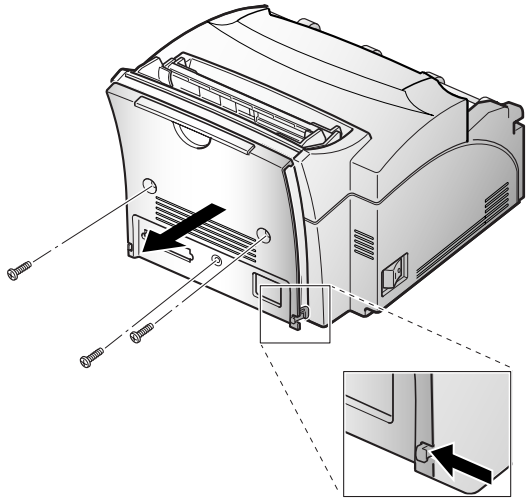


3-5 Top Cover and Rear Cover

1. Before you remove these covers, you should remove:
   -Face up cover and Front cover (see page 3-1)

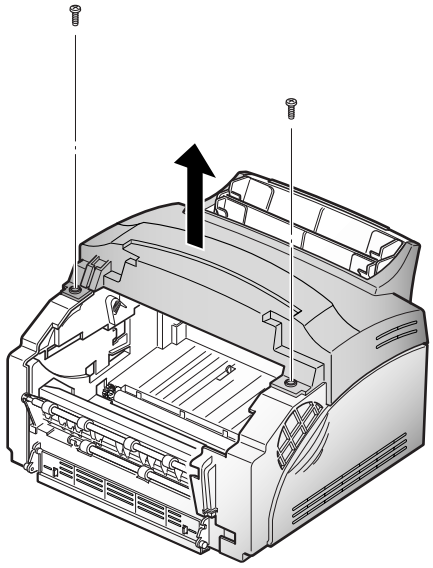
2. Remove three screws.

3. Unlatch the tabs on the left and right side end of the cover, then take out the rear cover.



Unlatch the tabs at both sides to remove the cover.

4. Remove two screws, and remove the top cover.

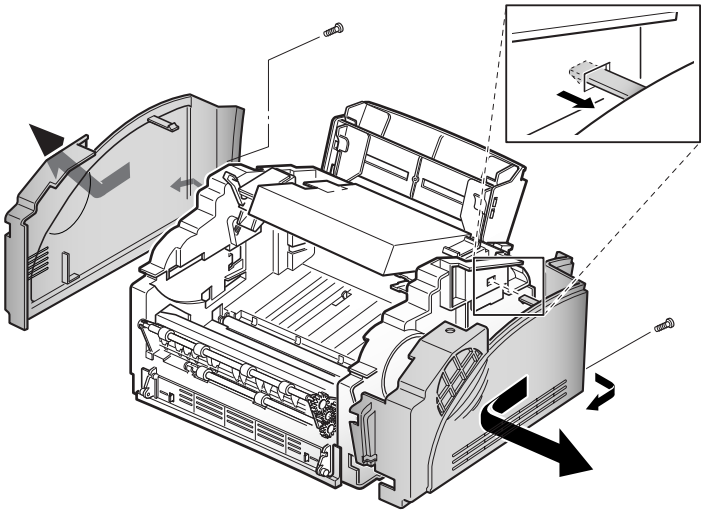


3-6 Side Covers (Left, Right)

1. Before you remove these side covers, you should remove:
   -Face up cover and Front cover (see page 3-1)
   -Top cover and Rear cover (see page 3-4)

2. Remove two screws on the back of the covers.

3. Unlatch the left and right side covers, and remove them.

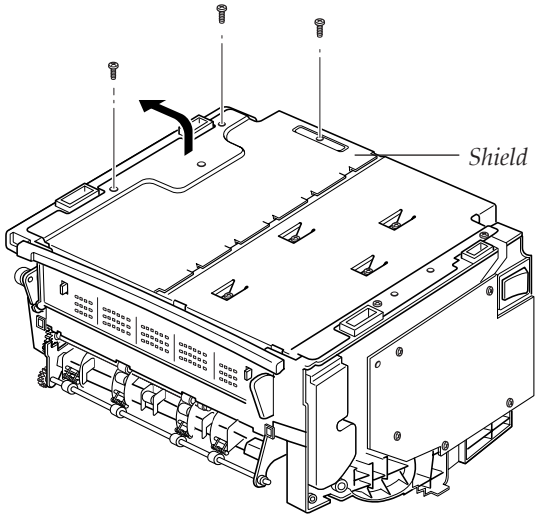


3-7 SMPS/Engine Control Board

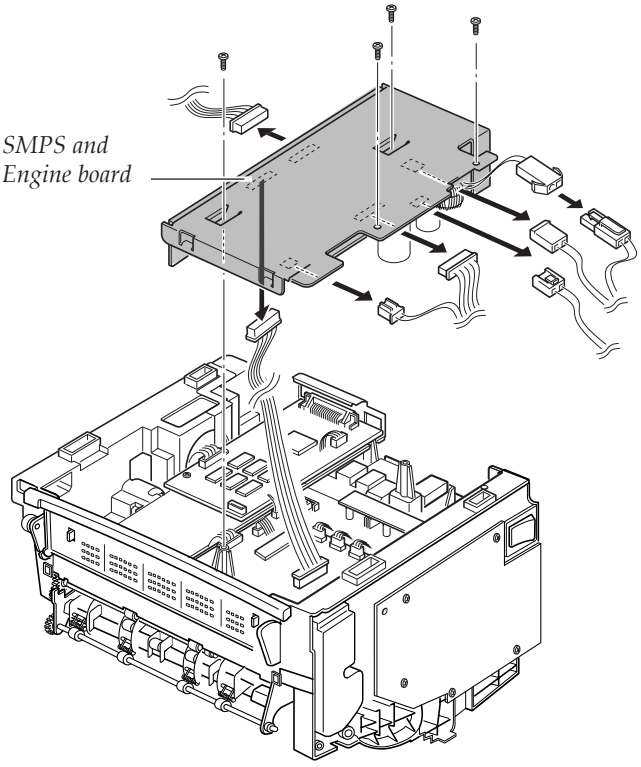
1. Before you remove the board, you should remove:
   -All covers (see pages 3-1, 3-4)

2. Turn the printer upside down.

3. Remove three screws securing the shield, then remove the shield.



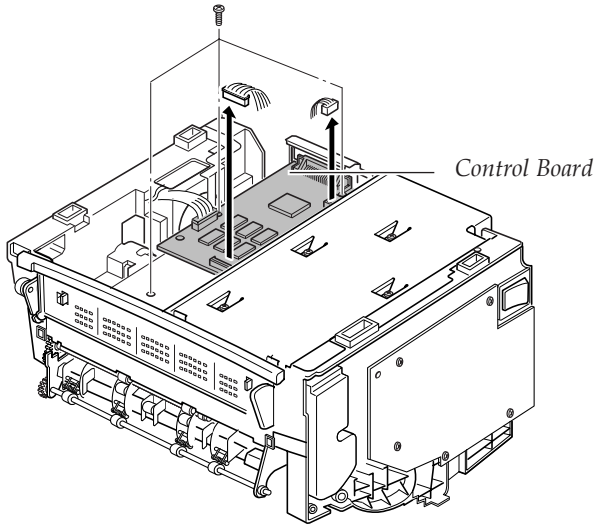
4. Unplug all the connectors from the SMPS, then take out the SMPS and the engine board.



3-8 Control Board

1. Before you remove the control board, you should remove:
   -All covers (see pages 3-1, 3-4)

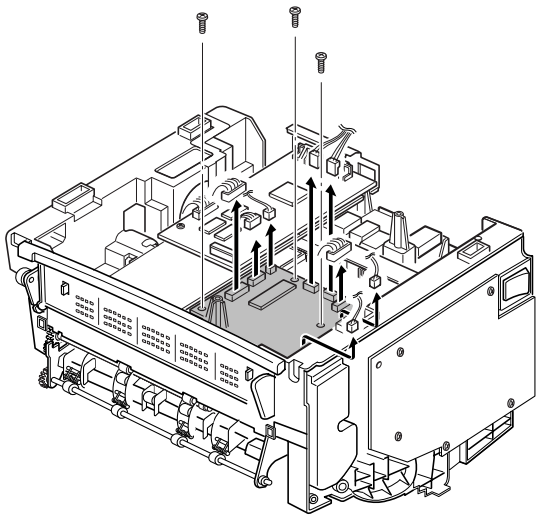
2. Unplug all the connectors from the control board, remove three screws, and take out the control board.



3-9 Joint Board

1. Before you remove the joint board, you should remove:
   -All covers (see pages 3-1, 3-4)
   -SMPS (see page 3-5)

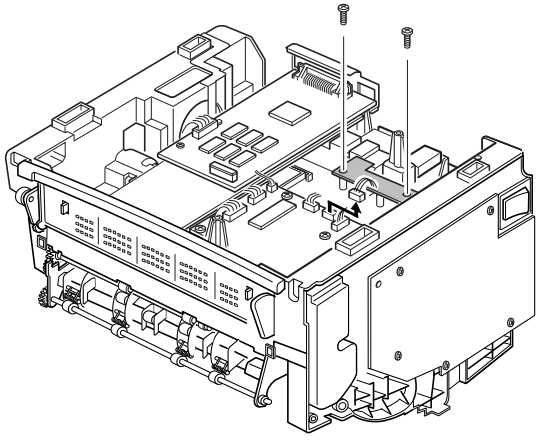
2. Unplug all connectors from the joint board, remove three screws, then remove the joint board.



3-10 Sensor Board

1. Before you remove the sensor board, you should remove:
   -All covers (see pages 3-1, 3-4)
   -SMPS (see page 3-5)

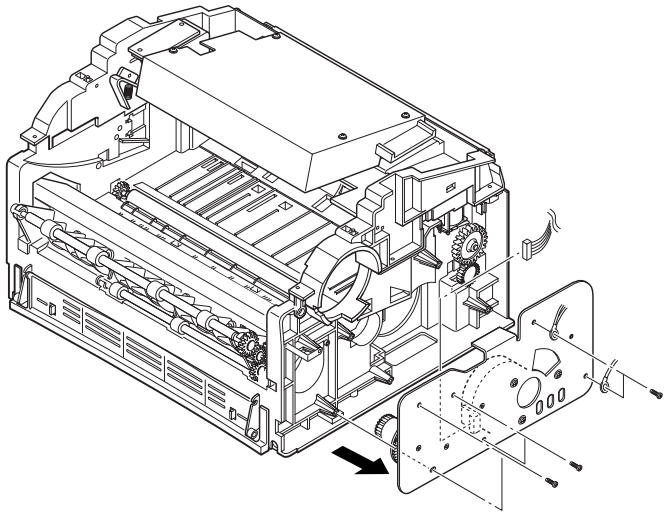
2. Remove two screws, unplug all connectors from the sensor board, then remove the board.



3-11 Gear Bracket

1. Before you remove the gear bracket, you should remove:
   -All covers (see pages 3-1, 3-4)

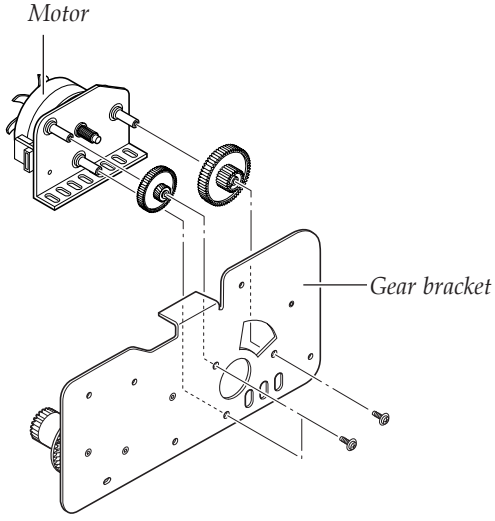
2. Remove six screws securing the gear bracket, unplug the connector from the motor, then remove the gear bracket.



3-12 Motor

1. Before you remove the motor, you should remove:
   -All covers (see pages 3-1, 3-4)
   -Gear bracket (see page 3-14)

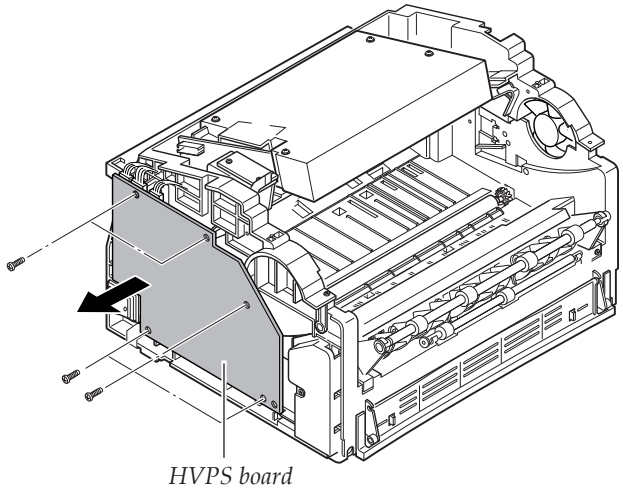
2. Remove three screws, then remove the motor.



3-13 HVPS Board

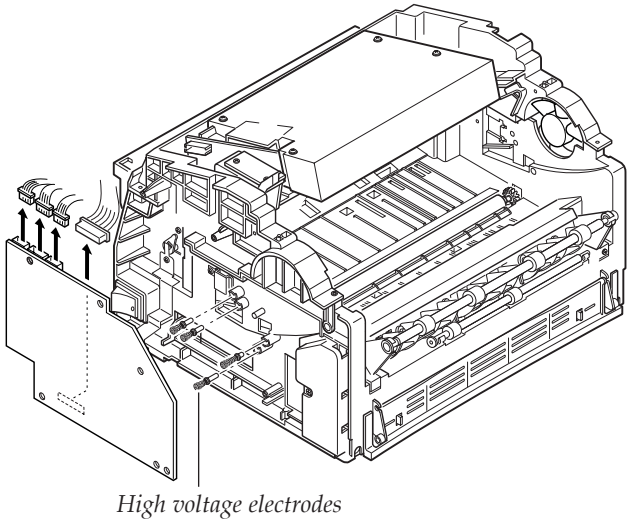
1. Before you remove the HVPS board, you should remove:
   -All covers (see pages 3-1, 3-4)

2. Remove five screws from the HVPS board.



HVPS board

3. Unplug the connector from the HVPS board, then remove the board.



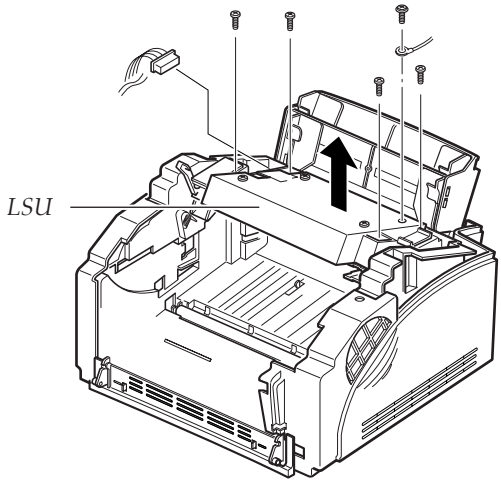
High voltage electrodes

Note: When you reassemble the HVPS board, make sure that the high voltage electrodes are placed correctly.

3-14 LSU

1. Before you remove the LSU, you should remove:
   -All covers (see pages 3-1, 3-4)

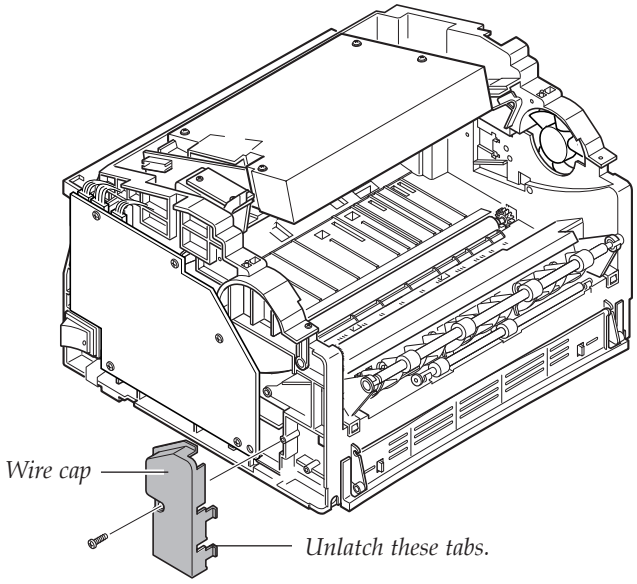
2. Unplug two connectors, remove five screws, then take out the LSU.



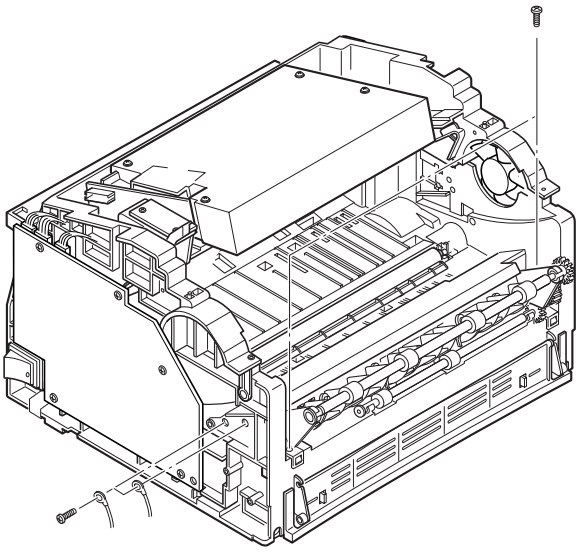
3-15 Fuser

1. Before you remove the fuser, you should remove:
   -All covers (see pages 3-1, 3-4)

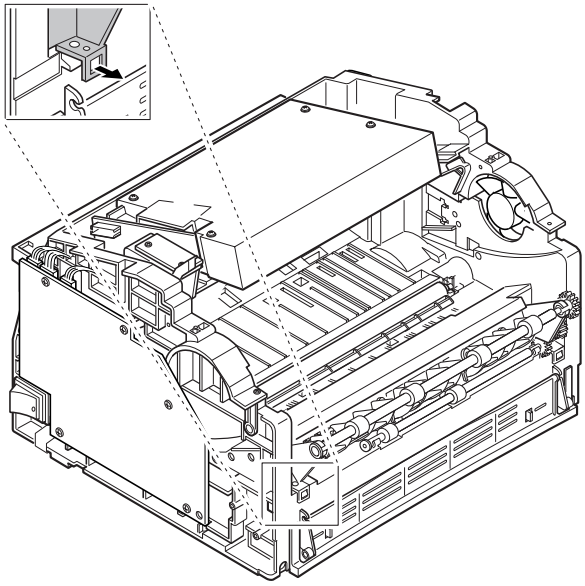
2. Remove one screw securing the wire cap at the left side of the frame, unlatch the cap, then remove the cap.



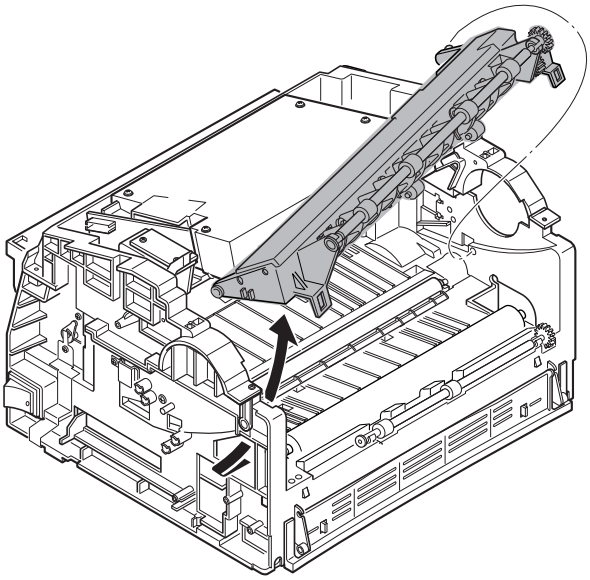
3. Remove four screws.



4. Unlatch the tabs using a proper tool.



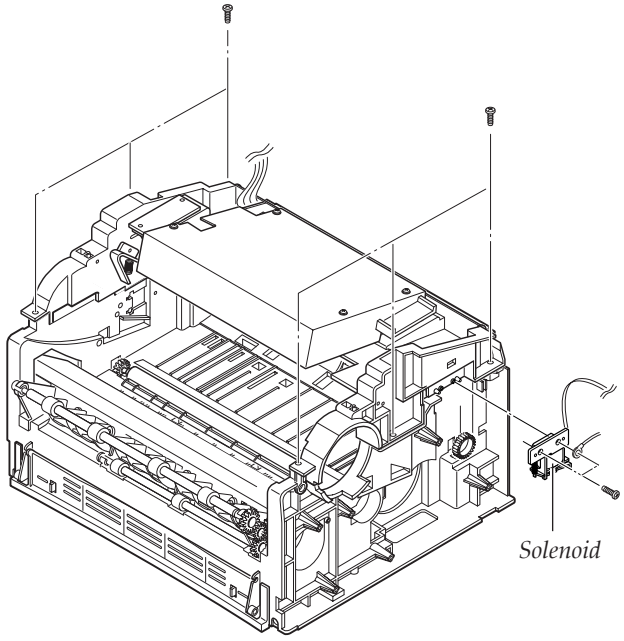
5. Slide the fuser in the direction of arrow and take it out.



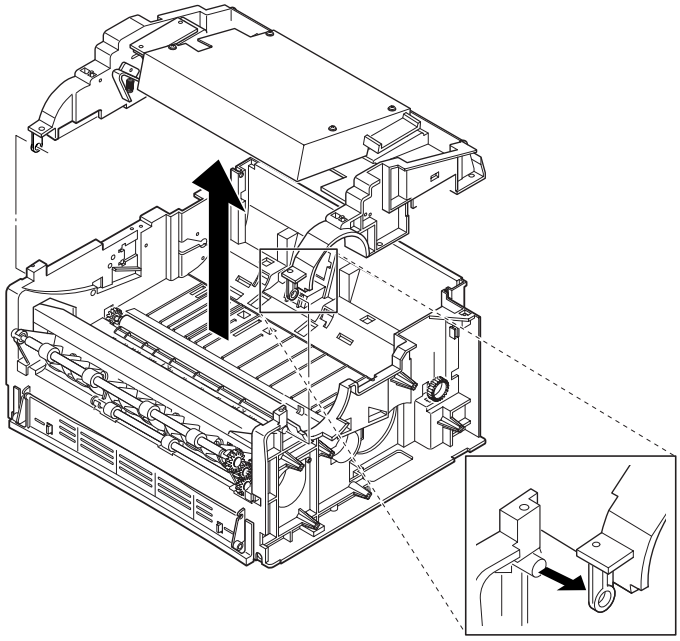
3-16 Upper Frame

1. Before you remove the upper frame, you should remove:
   -All covers (see pages 3-1, 3-4)
   -Gear bracket (see page 3-14)
   -HVPS board (see page 3-16)

2. Remove six screws, then remove two screws securing the solenoid.



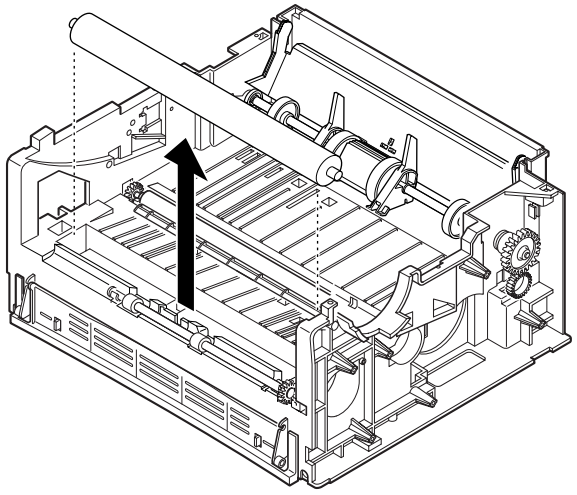
3. Unlatch the front end of the frame, then lift it up.



3-17 Pressure Roller

1. Before you remove the roller, you should remove:
   -All covers (see pages 3-1, 3-4)
   -All boards (see pages 3-3, 3-5, 3-6, 3-8)
   -Upper frame (see page 3-10)
   -Fuser (see page 3-9)

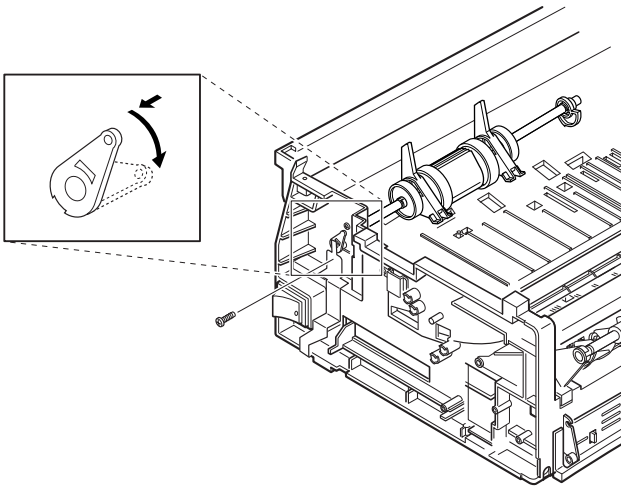
2. Remove the roller.



3-18 Pickup Roller

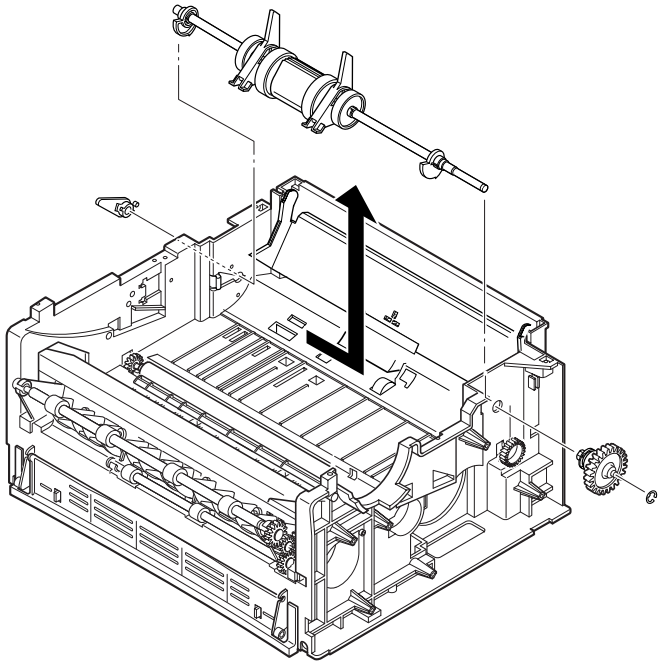
1. Before you remove the pickup roller, you should remove:
   -All covers (see pages 3-1, 3-4)
   -All boards (see pages 3-3, 3-5, 3-6, 3-8)
   -Upper frame (see page 3-9)

2. Remove one screw, pull the pick-up bushing slightly toward you, then rotate it clock-wise.



3. Remove the E-ring at the right end of the roller.

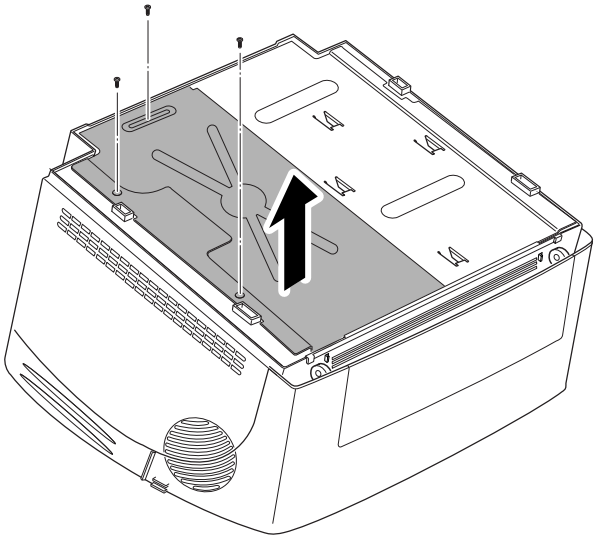
4. Remove a pin passing through a shaft to take out the pick-up roller, then push the roller shaft to the right. Lift the left side of the roller, then take it out.



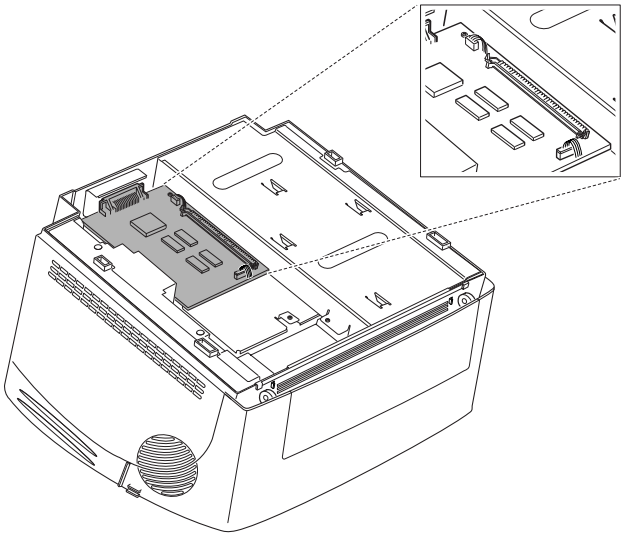
3-19 Installing SIMM

1. Before you install SIMM, make sure that printer power is off, all cables are unpluged. The toner cartridge is also to be removed.

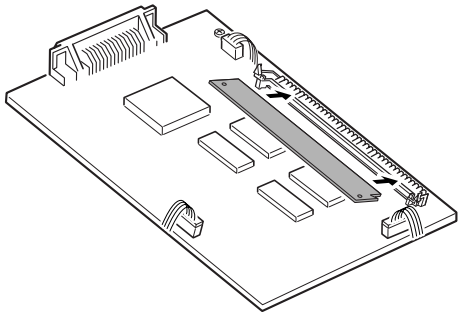
2. Turn the printer upside down, and remove all screws securing the shield cover, then remove the shield cover.



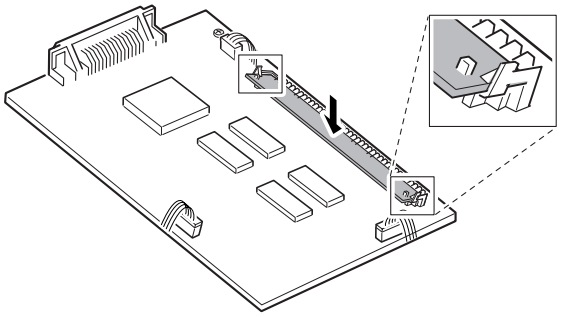
3. Locate the SIMM connector on the control board.



4. Hold the SIMM with the connection points and insert the SIMM all the way into the connector at 30° angle .

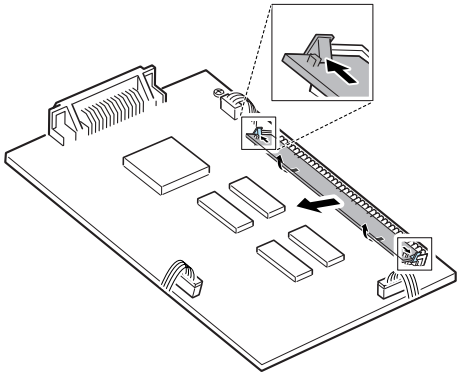


5. Push it firmly until it snaps into place.



Make sure both metal clips on the connector are fastened and the two pins on the connector are pushed through the holes on the SIMM.

Note: When you disassemble the SIMM, push out on the metal clips at each end of the connector and pull it toward you.



6. Reassemble the shield cover.

4. Troubleshooting

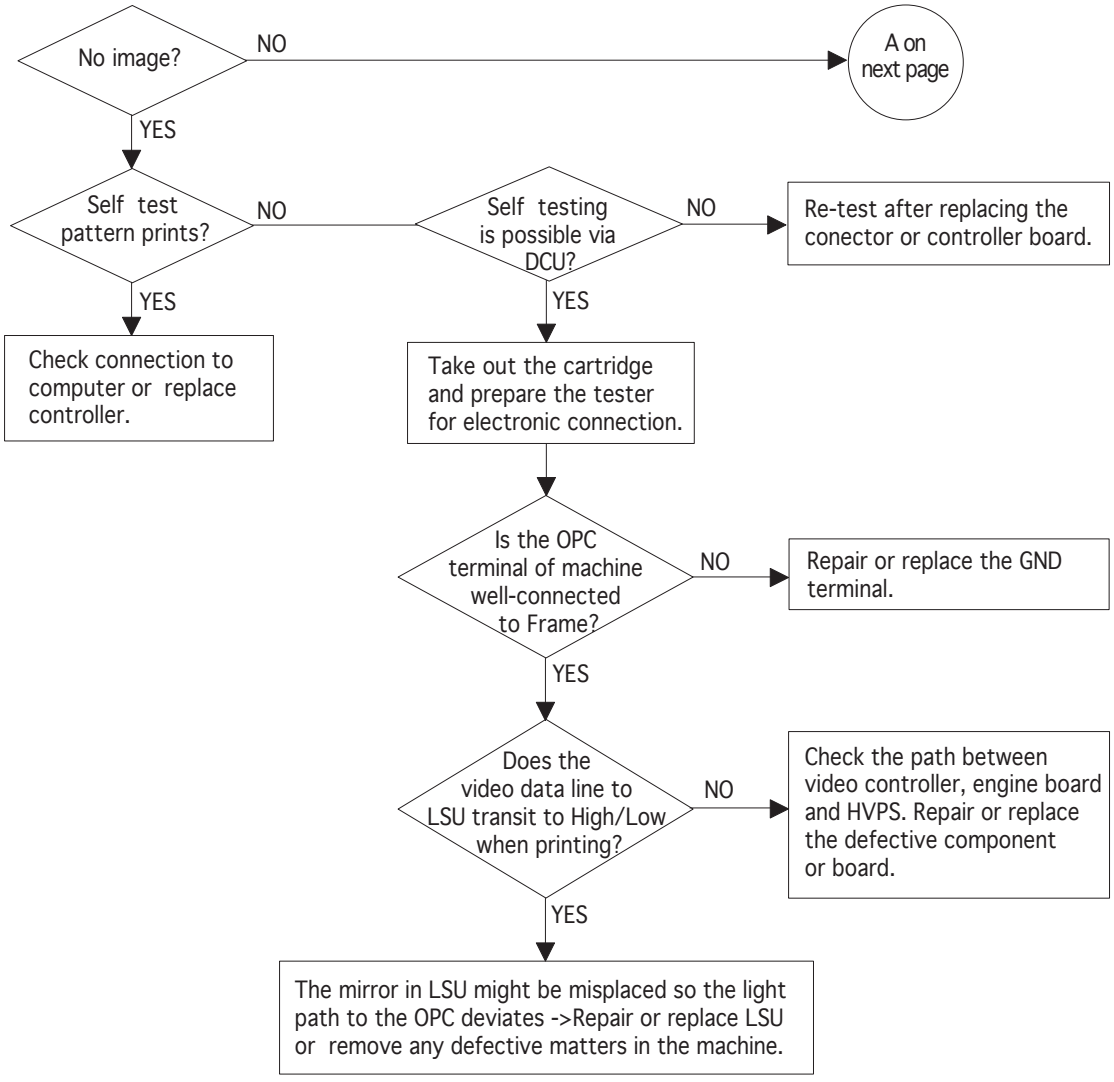
4-1 Abnormal Image Printing and Defective Roller

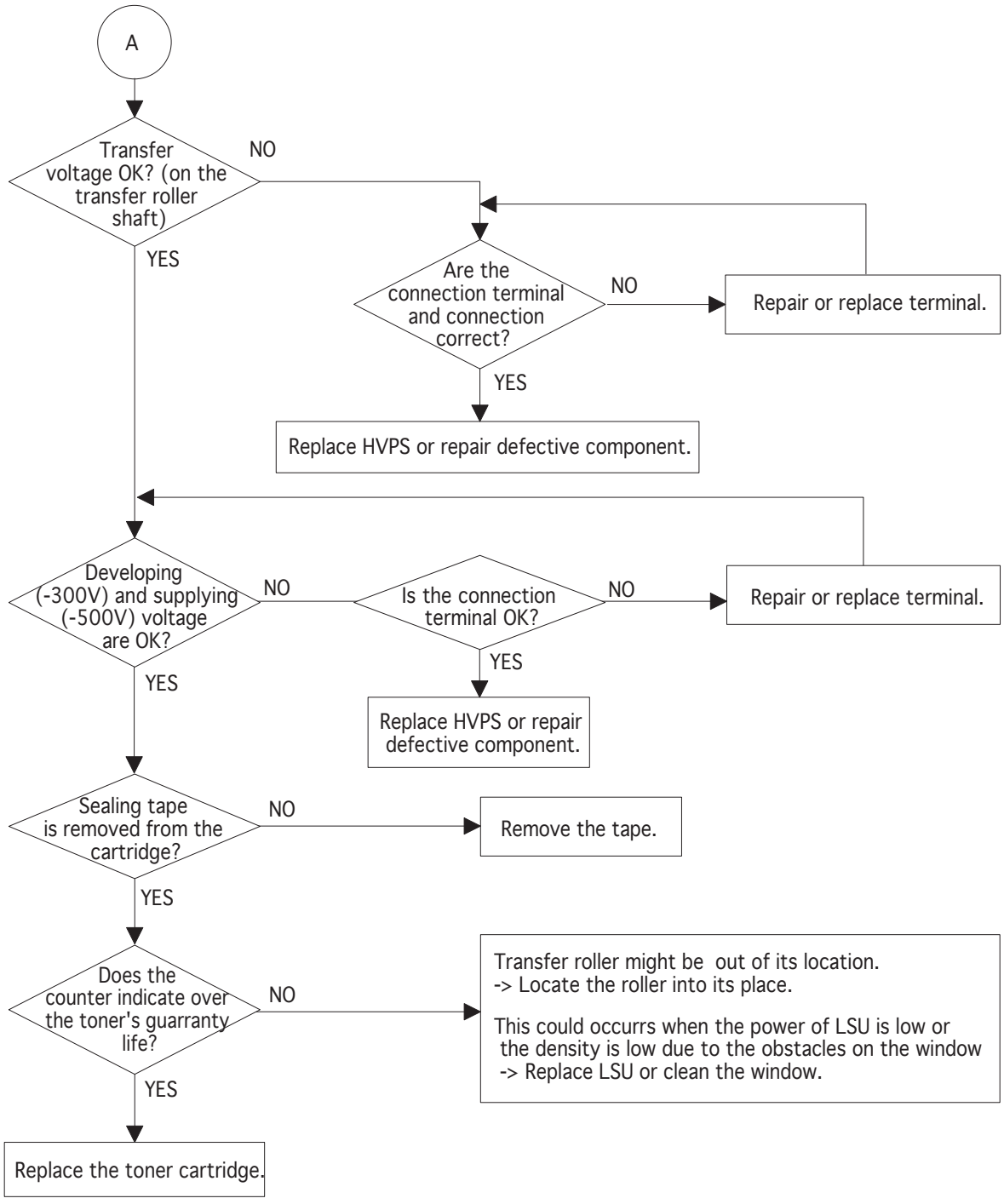
If abnormal image prints periodically, check the parts shown below.

No	Roller	Abnormal image period	Kind of abnormal image
1	OPC Drum	94.3mm	White spot
2	Charge Roller	37.7mm	Black spot
3	Supply Roller	40.0mm	Horizontal density band
4	Develop Roller	46.1mm	Horizontal density band
5	Transfer Roller	47.1mm	Black side contamination/transfer fault
6	Heat Roller	56.1mm	Black spot and fuser ghost
7	Pressure Roller	56.2mm	Black side contamination

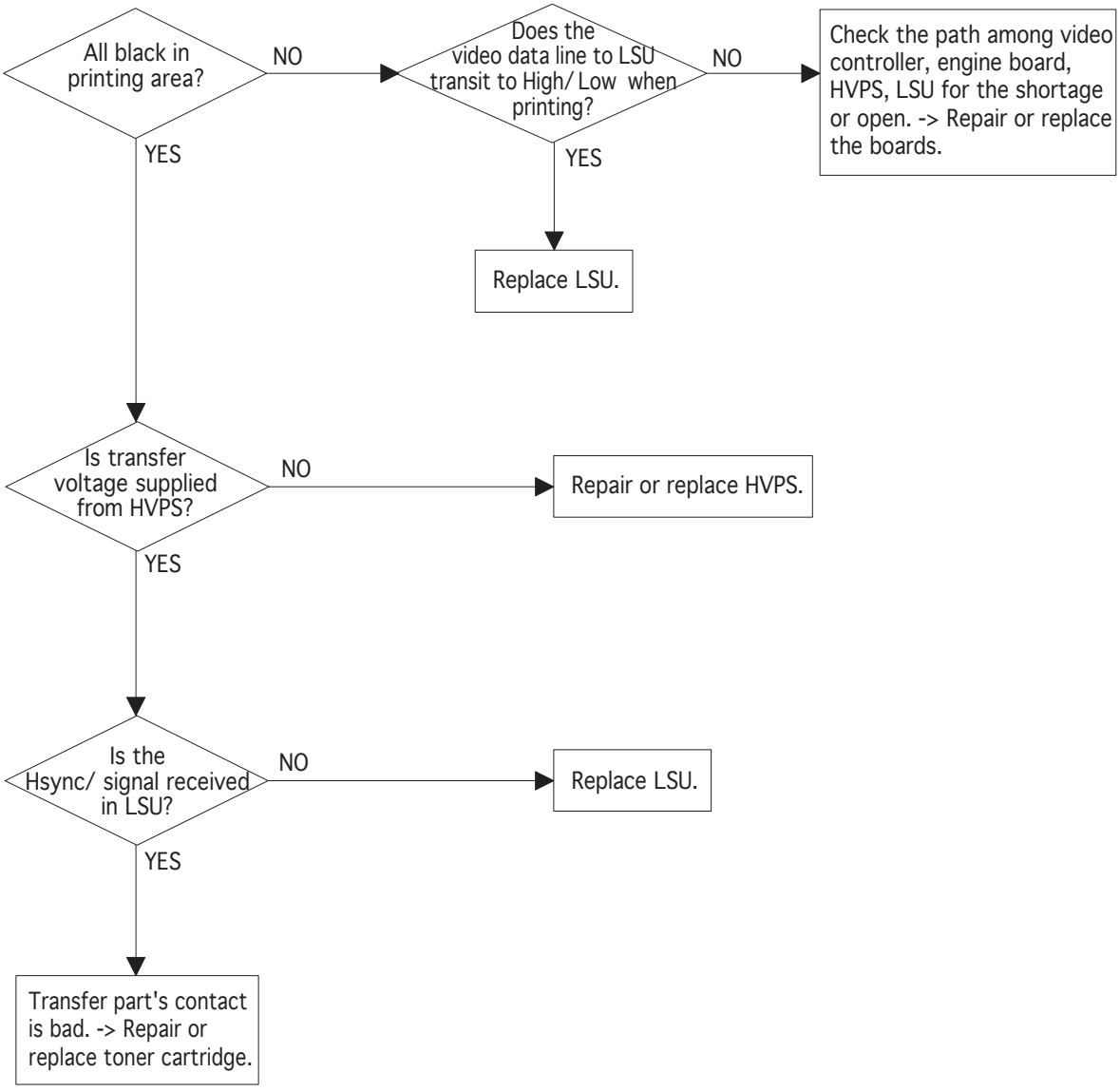
4-2 Print Quality

4-2-1 No Image

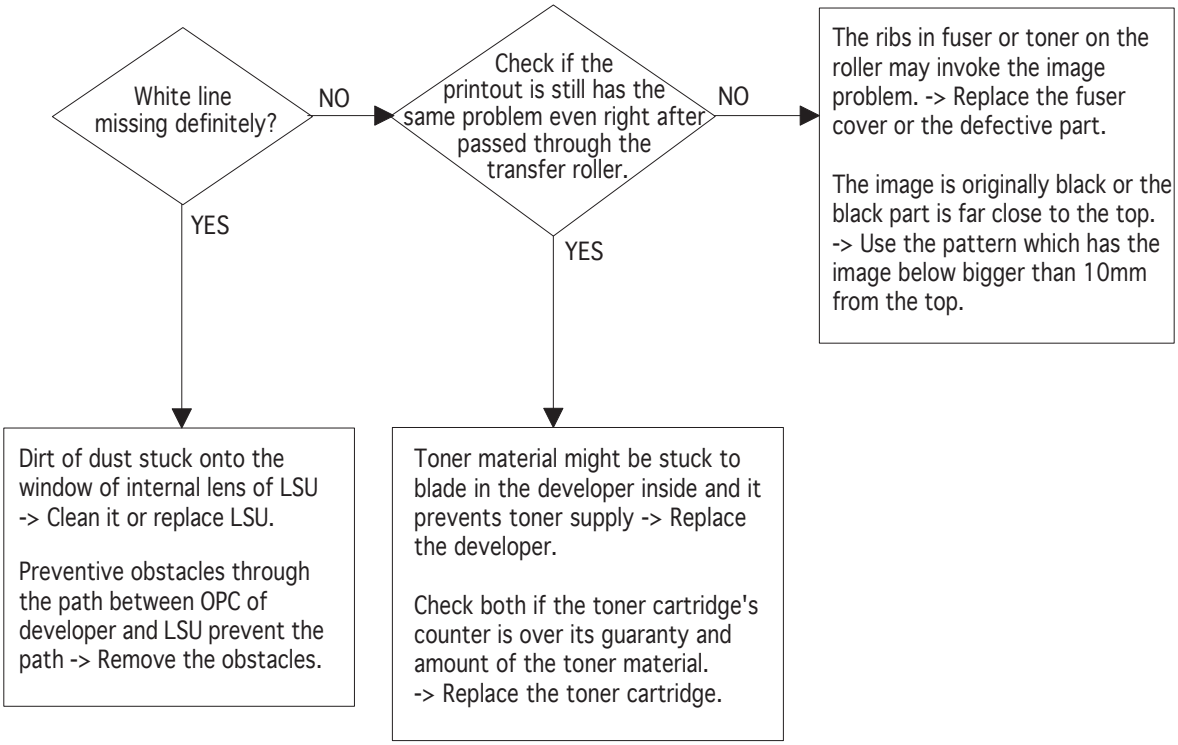

No image?
NO
A on next page
YES
Self test pattern prints?
NO
Self testing is possible via DCU?
NO
Re-test after replacing the conector or controller board.
YES
YES
Check connection to computer or replace controller.
Take out the cartridge and prepare the tester for electronic connection.
Is the OPC terminal of machine well-connected to Frame?
NO
Repair or replace the GND terminal.
YES
Does the video data line to LSU transit to High/Low when printing?
NO
Check the path between video controller, engine board and HVPS. Repair or replace the defective component or board.
YES
The mirror in LSU might be misplaced so the light path to the OPC deviates ->Repair or replace LSU or remove any defective matters in the machine.


A
Transfer voltage OK? (on the transfer roller shaft)
NO
YES
Are the connection terminal and connection correct?
NO
Repair or replace terminal.
YES
Replace HVPS or repair defective component.
Developing (-300V) and supplying (-500V) voltage are OK?
NO
Is the connection terminal OK?
NO
Repair or replace terminal.
YES
YES
Replace HVPS or repair defective component.
Sealing tape is removed from the cartridge?
NO
Remove the tape.
YES
Does the counter indicate over the toner's guarranty life?
NO
Transfer roller might be out of its location.
-> Locate the roller into its place.
This could occurrs when the power of LSU is low or the density is low due to the obstacles on the window
-> Replace LSU or clean the window.
YES
Replace the toner cartridge.

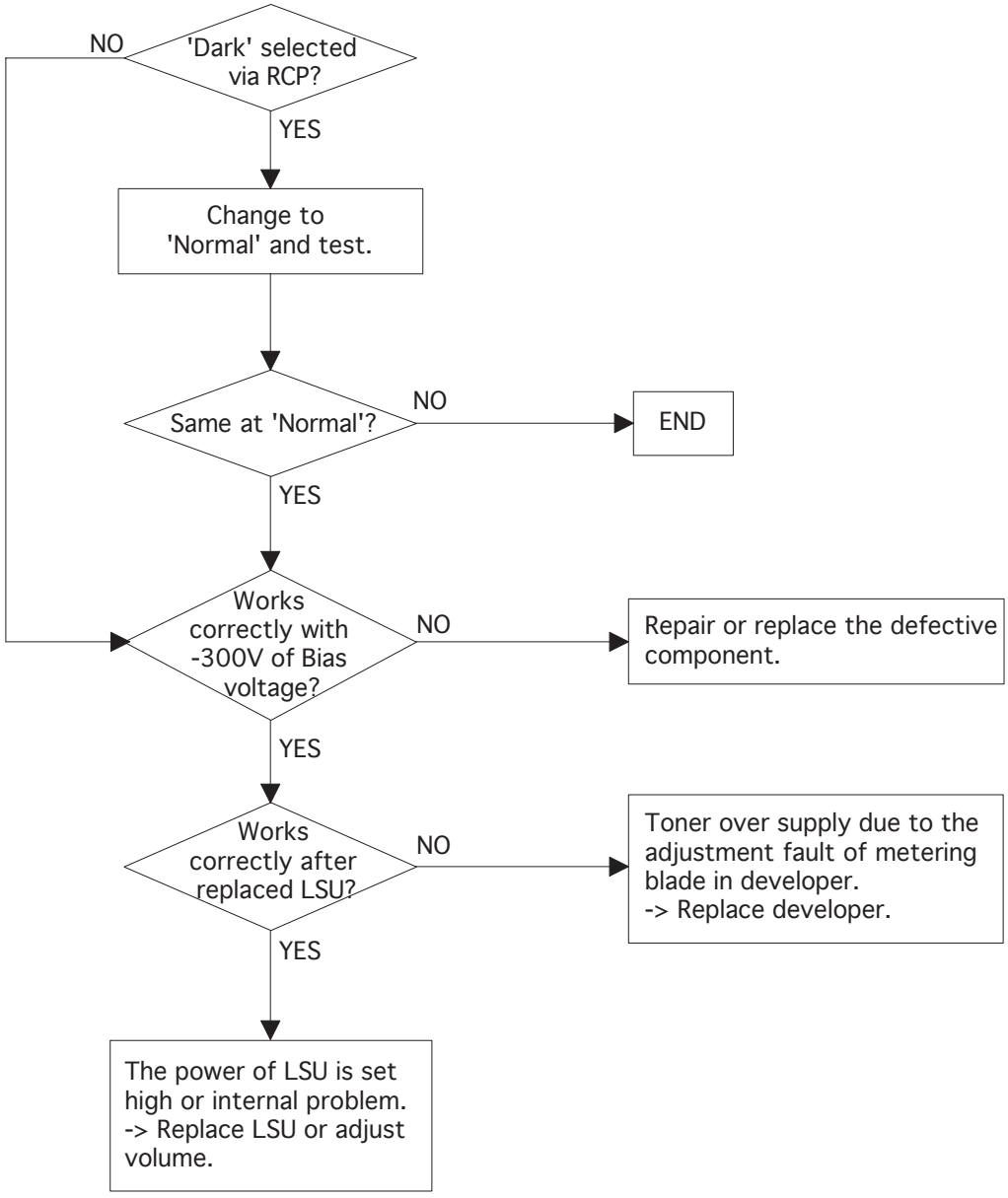
4-2-2 All Black


All black in printing area?
NO
Does the video data line to LSU transit to High/ Low when printing?
NO
Check the path among video controller, engine board, HVPS, LSU for the shortage or open. -> Repair or replace the boards.
YES
YES
Replace LSU.
Is transfer voltage supplied from HVPS?
NO
Repair or replace HVPS.
YES
Is the Hsync/ signal received in LSU?
NO
Replace LSU.
YES
Transfer part's contact is bad. -> Repair or replace toner cartridge.

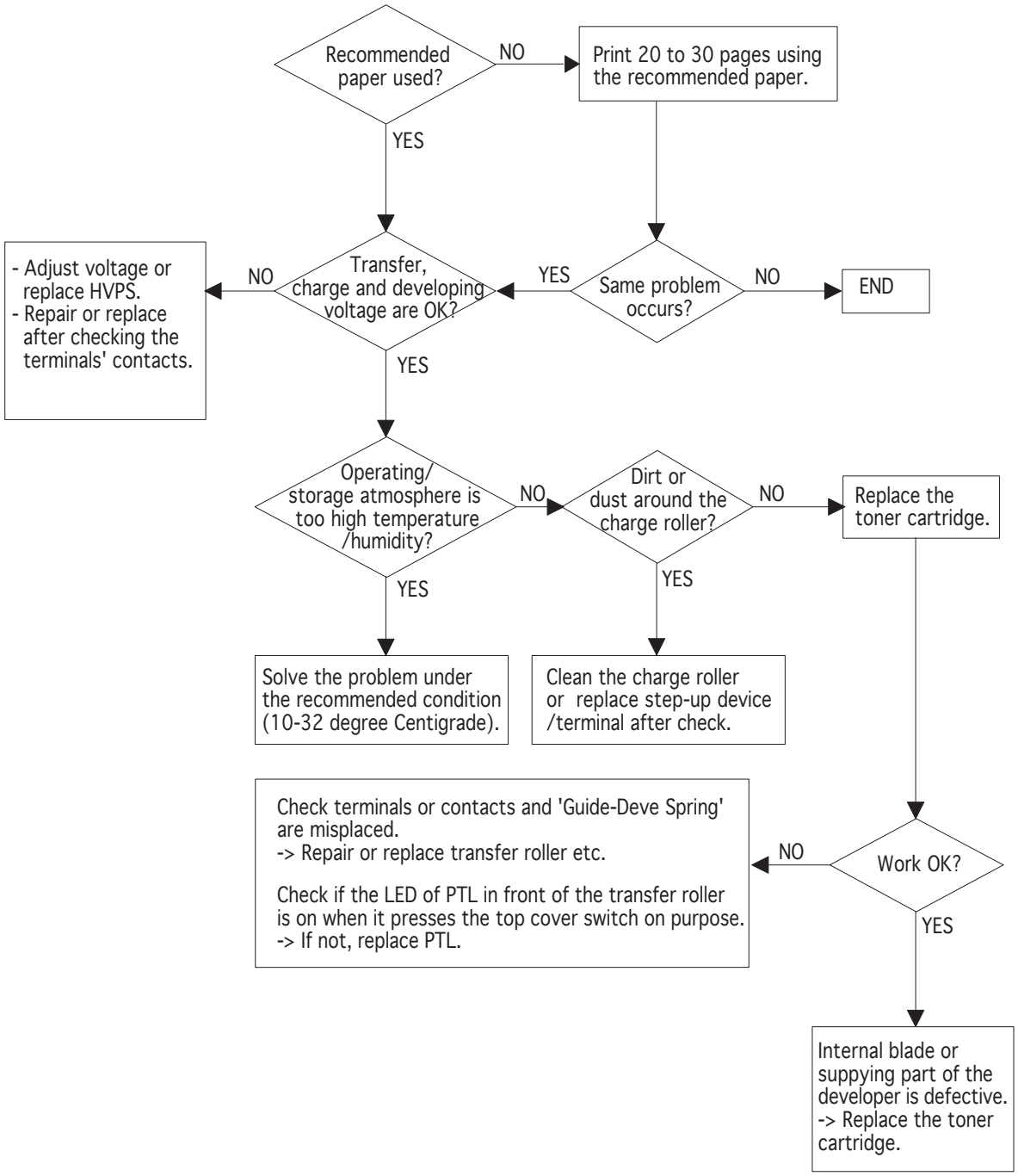
4-2-3 Vertical White Line (Band)


White line missing definitely?
NO
Check if the printout is still has the same problem even right after passed through the transfer roller.
NO
The ribs in fuser or toner on the roller may invoke the image problem. -> Replace the fuser cover or the defective part.
The image is originally black or the black part is far close to the top. -> Use the pattern which has the image below bigger than 10mm from the top.
YES
YES
Dirt of dust stuck onto the window of internal lens of LSU -> Clean it or replace LSU.
Preventive obstacles through the path between OPC of developer and LSU prevent the path -> Remove the obstacles.
Toner material might be stuck to blade in the developer inside and it prevents toner supply -> Replace the developer.
Check both if the toner cartridge's counter is over its guaranty and amount of the toner material. -> Replace the toner cartridge.

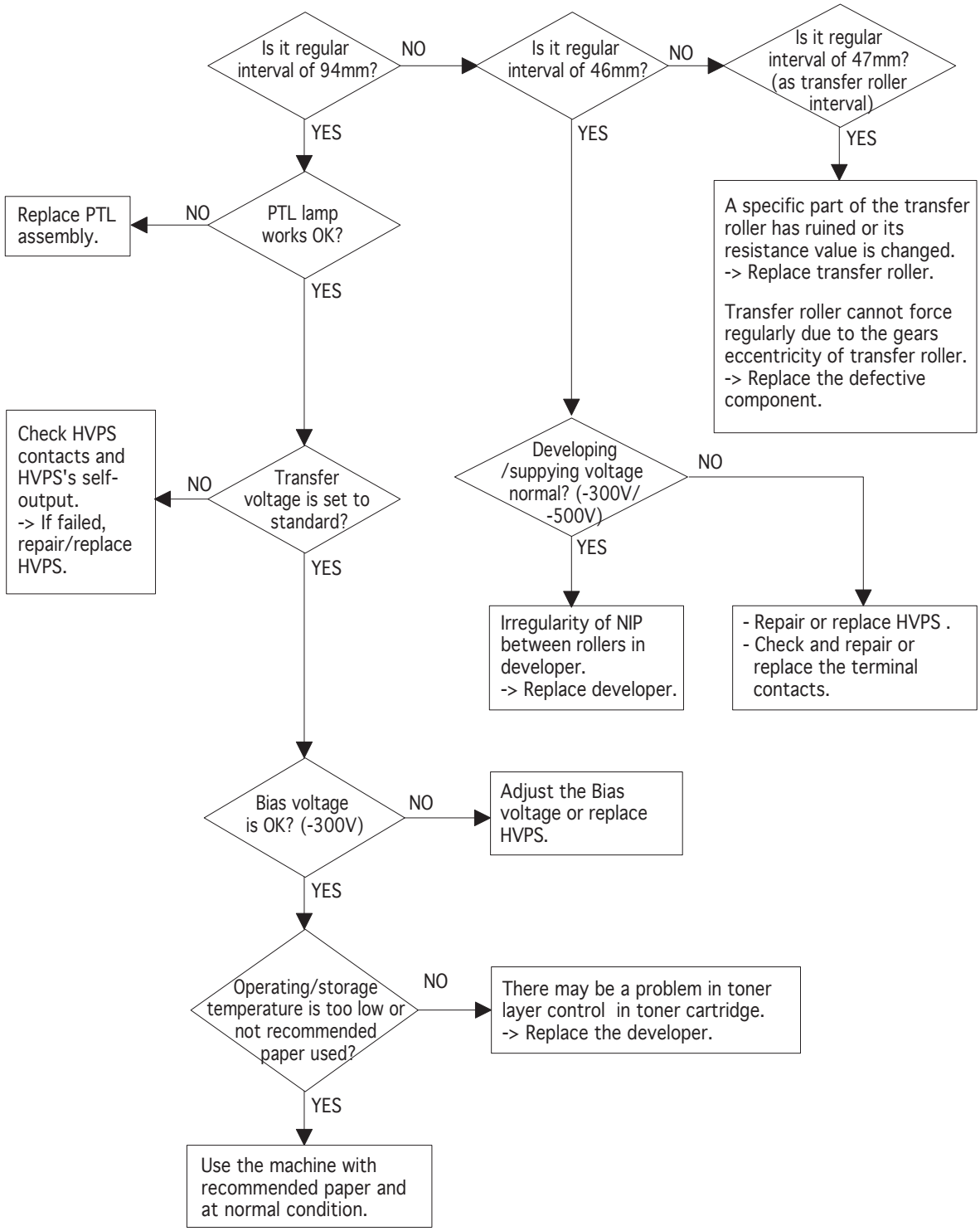
4-2-4 Dark Image



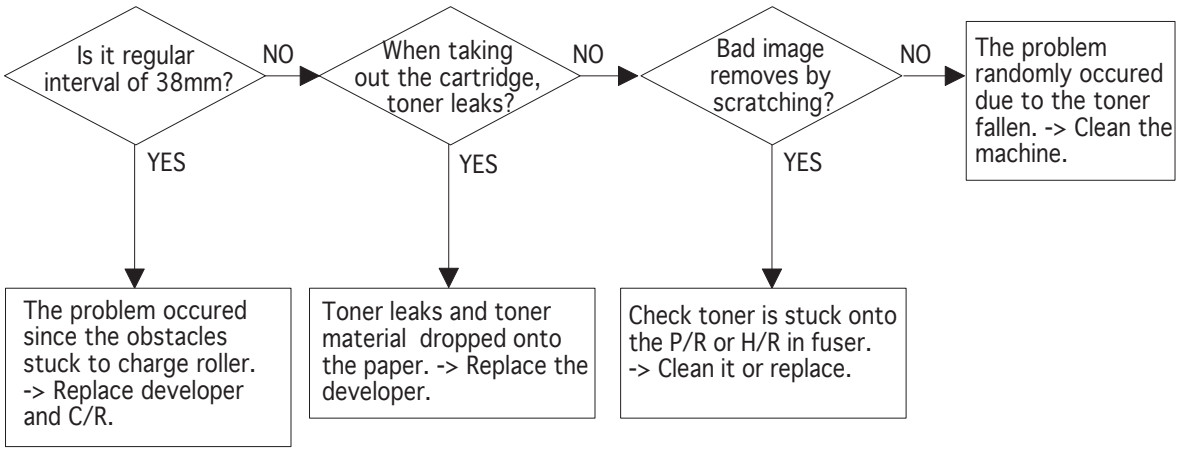
4-2-5 Background


Recommended paper used?
NO
Print 20 to 30 pages using the recommended paper.
YES
- Adjust voltage or replace HVPS.
- Repair or replace after checking the terminals' contacts.
NO
Transfer, charge and developing voltage are OK?
YES
Same problem occurs?
NO
END
YES
Operating/ storage atmosphere is too high temperature /humidity?
NO
Dirt or dust around the charge roller?
NO
Replace the toner cartridge.
YES
YES
Solve the problem under the recommended condition (10-32 degree Centigrade).
Clean the charge roller or replace step-up device /terminal after check.
Check terminals or contacts and 'Guide-Deve Spring' are misplaced.
-> Repair or replace transfer roller etc.
Check if the LED of PTL in front of the transfer roller is on when it presses the top cover switch on purpose.
-> If not, replace PTL.
NO
Work OK?
YES
Internal blade or suppying part of the developer is defective.
-> Replace the toner cartridge.

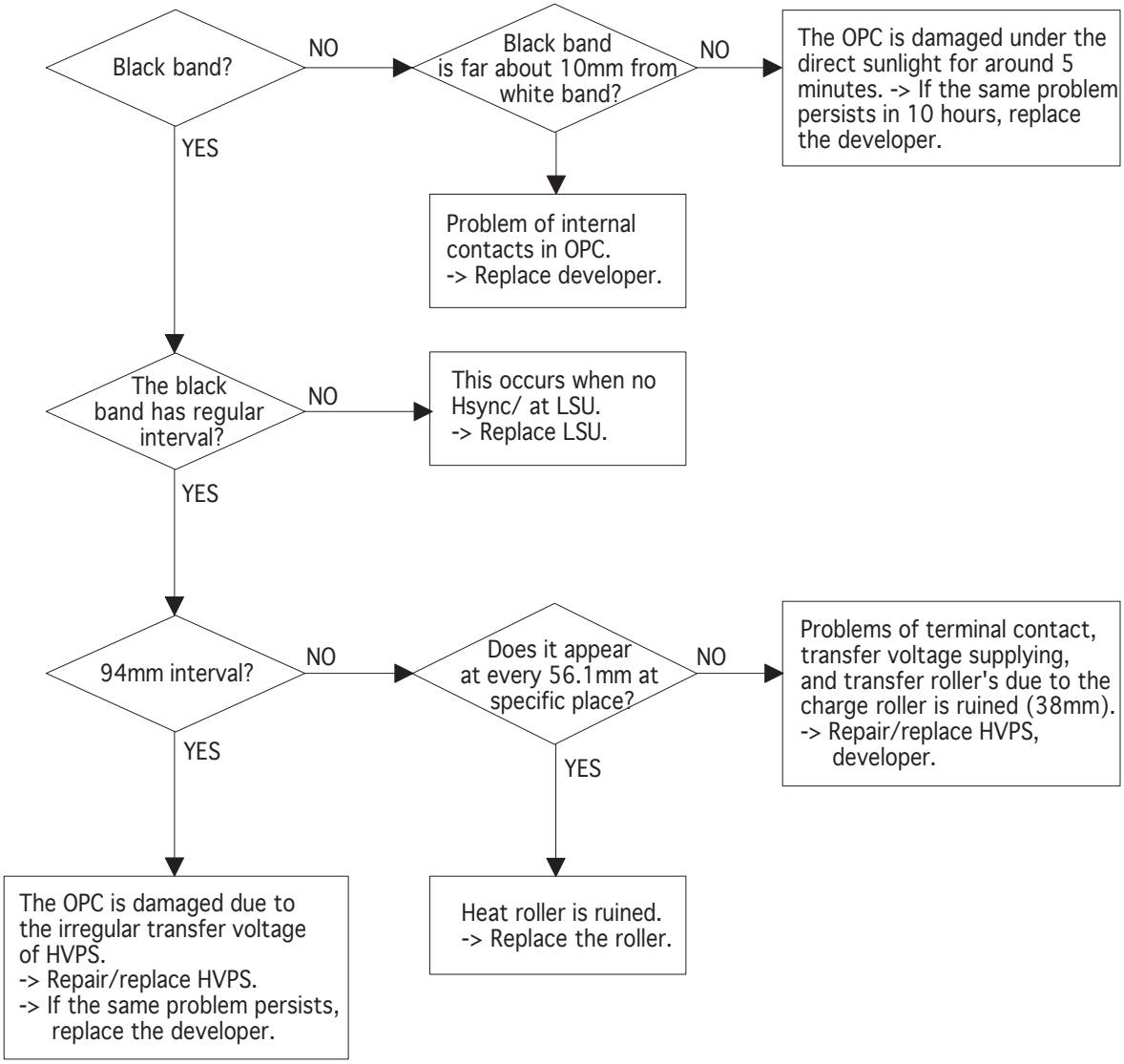
4-2-6 Ghost


Is it regular interval of 94mm?
NO
Is it regular interval of 46mm?
NO
Is it regular interval of 47mm? (as transfer roller interval)
YES
YES
YES
Replace PTL assembly.
NO
PTL lamp works OK?
YES
A specific part of the transfer roller has ruined or its resistance value is changed.
-> Replace transfer roller.
Transfer roller cannot force regularly due to the gears eccentricity of transfer roller.
-> Replace the defective component.
Check HVPS contacts and HVPS's self-output.
-> If failed, repair/replace HVPS.
NO
Transfer voltage is set to standard?
YES
Developing /suppying voltage normal? (-300V/ -500V)
NO
YES
Irregularity of NIP between rollers in developer.
-> Replace developer.
- Repair or replace HVPS .
- Check and repair or replace the terminal contacts.
Bias voltage is OK? (-300V)
NO
Adjust the Bias voltage or replace HVPS.
YES
Operating/storage temperature is too low or not recommended paper used?
NO
There may be a problem in toner layer control in toner cartridge.
-> Replace the developer.
YES
Use the machine with recommended paper and at normal condition.

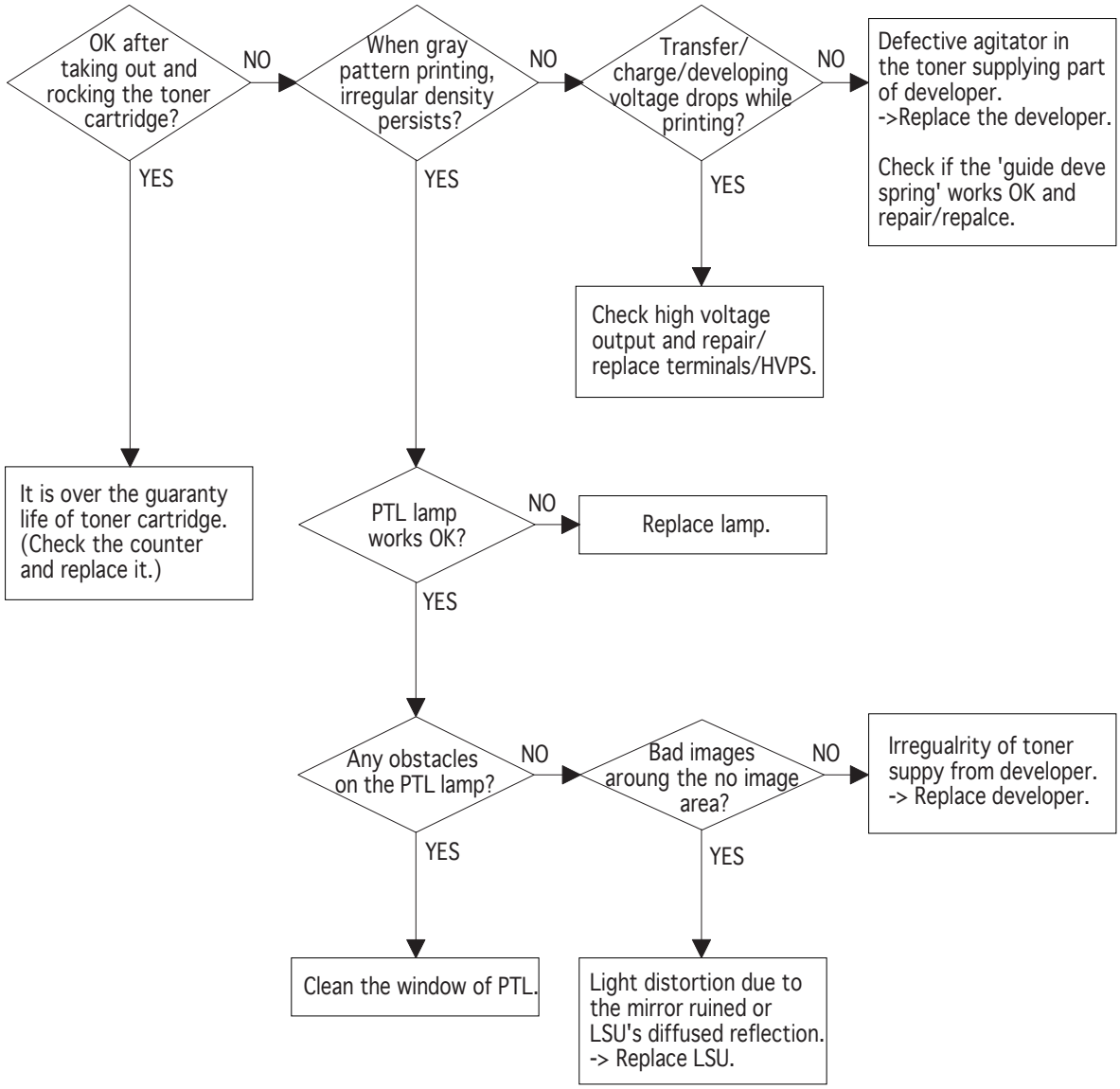
4-2-7 Black Dot


Is it regular interval of 38mm?
NO
When taking out the cartridge, toner leaks?
NO
Bad image removes by scratching?
NO
The problem randomly occured due to the toner fallen. -> Clean the machine.
YES
YES
YES
The problem occured since the obstacles stuck to charge roller. -> Replace developer and C/R.
Toner leaks and toner material dropped onto the paper. -> Replace the developer.
Check toner is stuck onto the P/R or H/R in fuser. -> Clean it or replace.

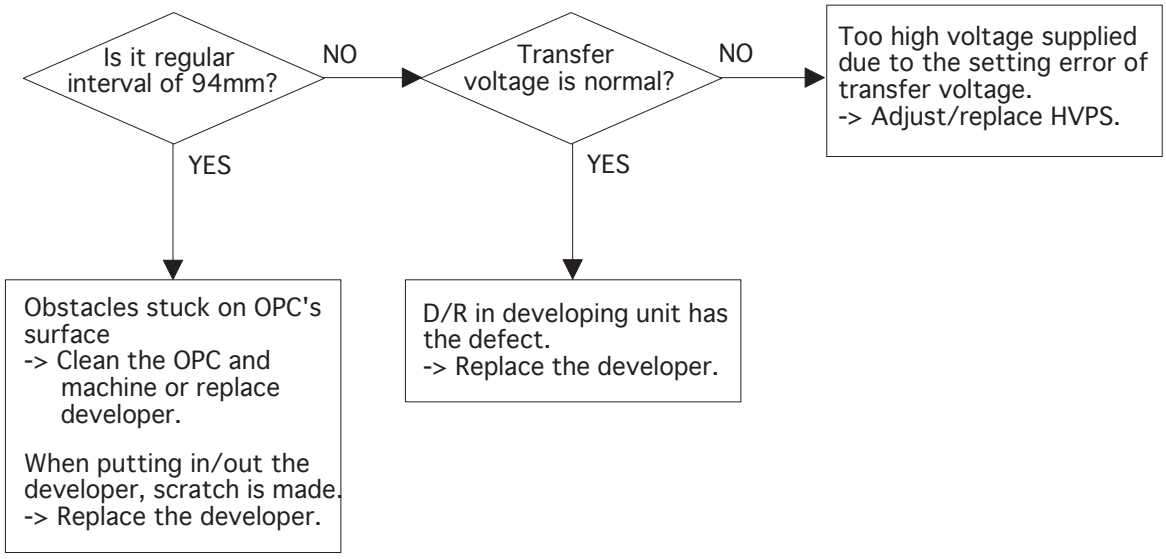
4-2-8 Horizontal Band


Black band?
NO
Black band is far about 10mm from white band?
NO
The OPC is damaged under the direct sunlight for around 5 minutes. -> If the same problem persists in 10 hours, replace the developer.
YES
Problem of internal contacts in OPC. -> Replace developer.
The black band has regular interval?
NO
This occurs when no Hsync/ at LSU. -> Replace LSU.
YES
94mm interval?
NO
Does it appear at every 56.1mm at specific place?
NO
Problems of terminal contact, transfer voltage supplying, and transfer roller's due to the charge roller is ruined (38mm). -> Repair/replace HVPS, developer.
YES
YES
The OPC is damaged due to the irregular transfer voltage of HVPS. -> Repair/replace HVPS. -> If the same problem persists, replace the developer.
Heat roller is ruined. -> Replace the roller.

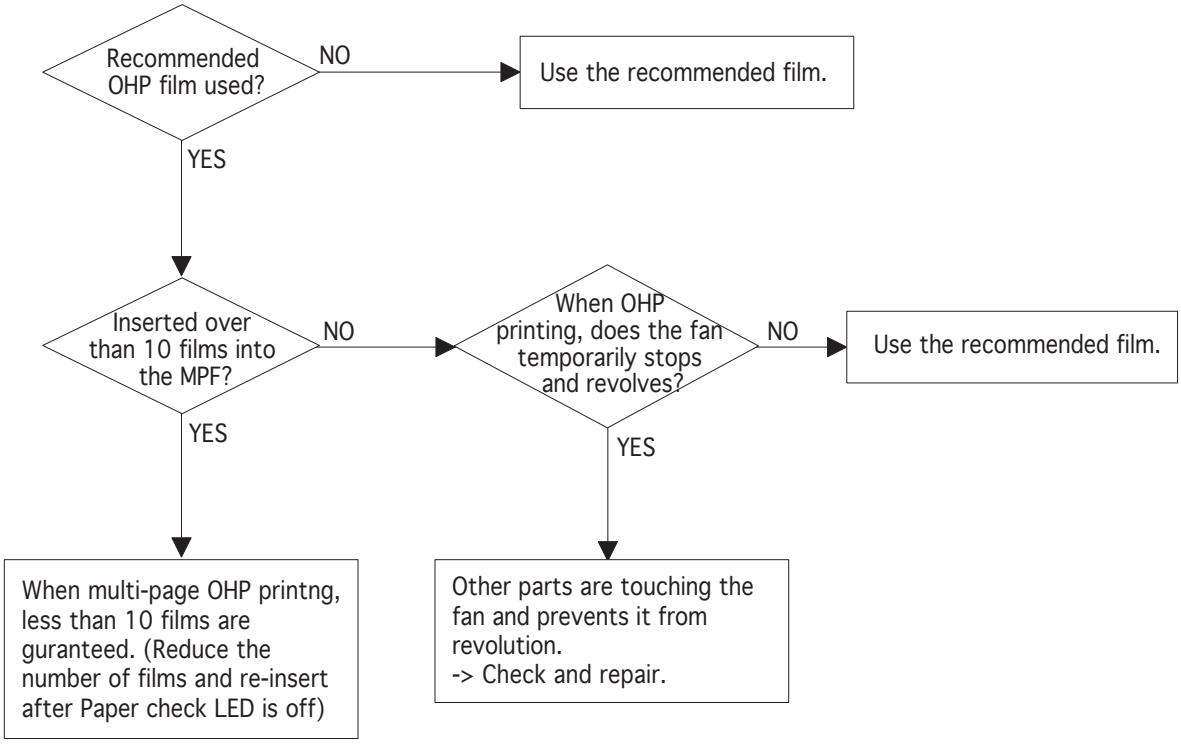
4-2-9 Irregular Density


OK after taking out and rocking the toner cartridge?
NO
When gray pattern printing, irregular density persists?
NO
Transfer/ charge/developing voltage drops while printing?
NO
Defective agitator in the toner supplying part of developer.
->Replace the developer.
Check if the 'guide deve spring' works OK and repair/repalce.
YES
YES
YES
Check high voltage output and repair/ replace terminals/HVPS.
It is over the guaranty life of toner cartridge. (Check the counter and replace it.)
PTL lamp works OK?
NO
Replace lamp.
YES
Any obstacles on the PTL lamp?
NO
Bad images aroung the no image area?
NO
Irregualrity of toner suppy from developer.
-> Replace developer.
YES
YES
Clean the window of PTL.
Light distortion due to the mirror ruined or LSU's diffused reflection.
-> Replace LSU.

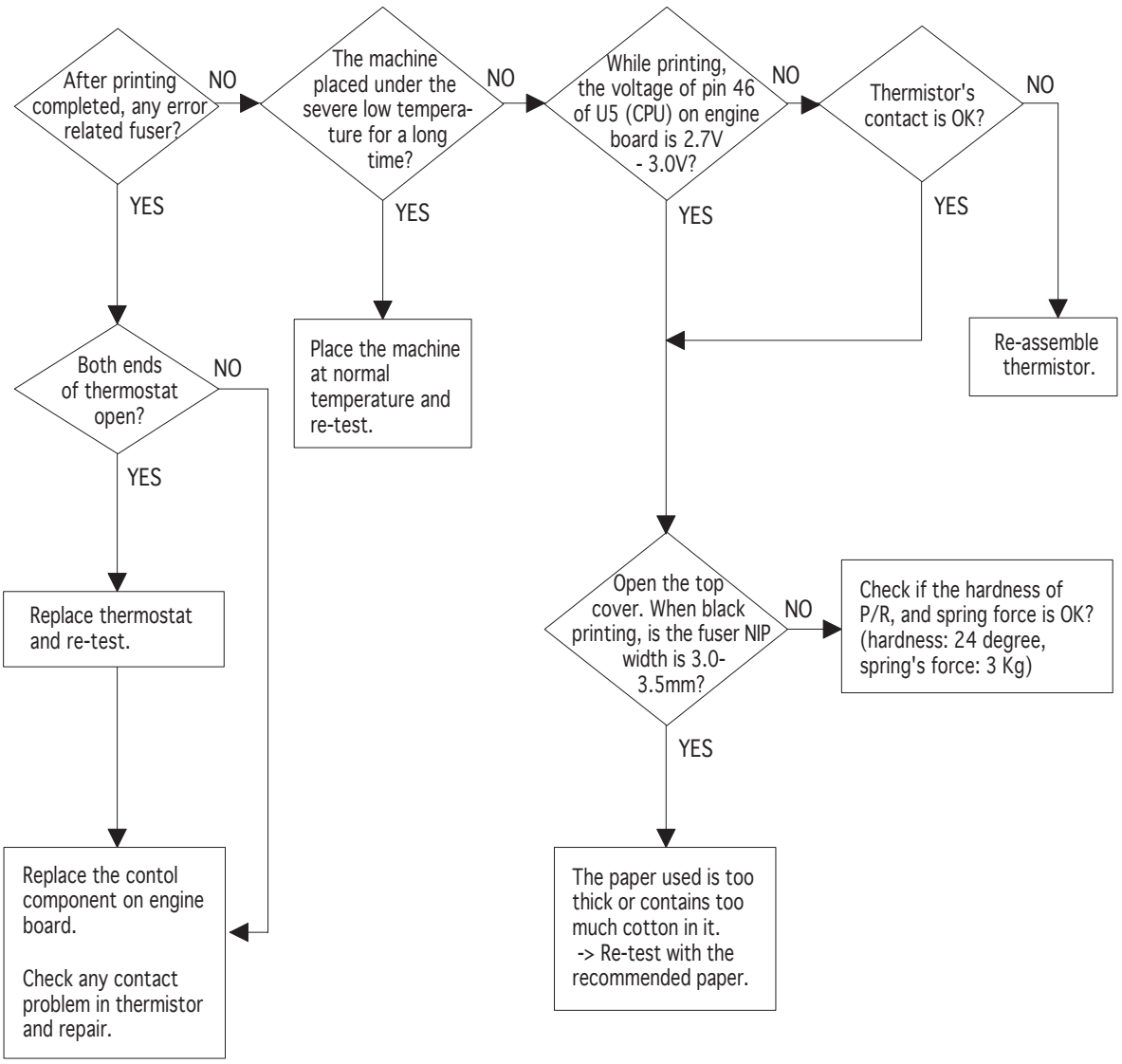
4-2-10 White Spot


Is it regular interval of 94mm?
NO
Transfer voltage is normal?
NO
Too high voltage supplied due to the setting error of transfer voltage.
-> Adjust/replace HVPS.
YES
YES
Obstacles stuck on OPC's surface
-> Clean the OPC and machine or replace developer.
When putting in/out the developer, scratch is made.
-> Replace the developer.
D/R in developing unit has the defect.
-> Replace the developer.

4-2-11 Trembling at the End When OHP Printing

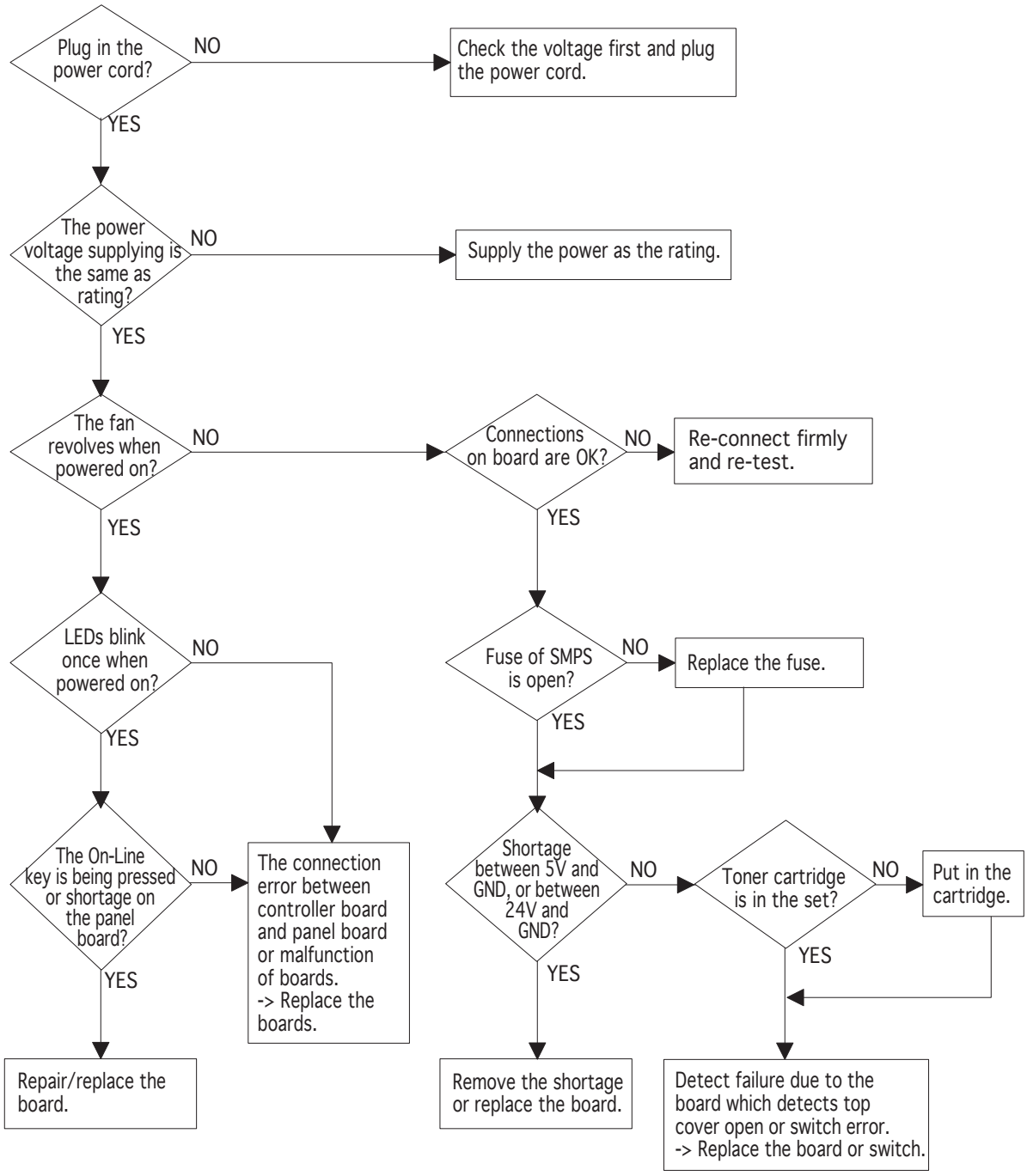

Recommended OHP film used?
NO
Use the recommended film.
YES
Inserted over than 10 films into the MPF?
NO
When OHP printing, does the fan temporarily stops and revolves?
NO
Use the recommended film.
YES
YES
When multi-page OHP printng, less than 10 films are guranteed. (Reduce the number of films and re-insert after Paper check LED is off)
Other parts are touching the fan and prevents it from revolution.
-> Check and repair.

4-2-12 Poor Fusing Grade

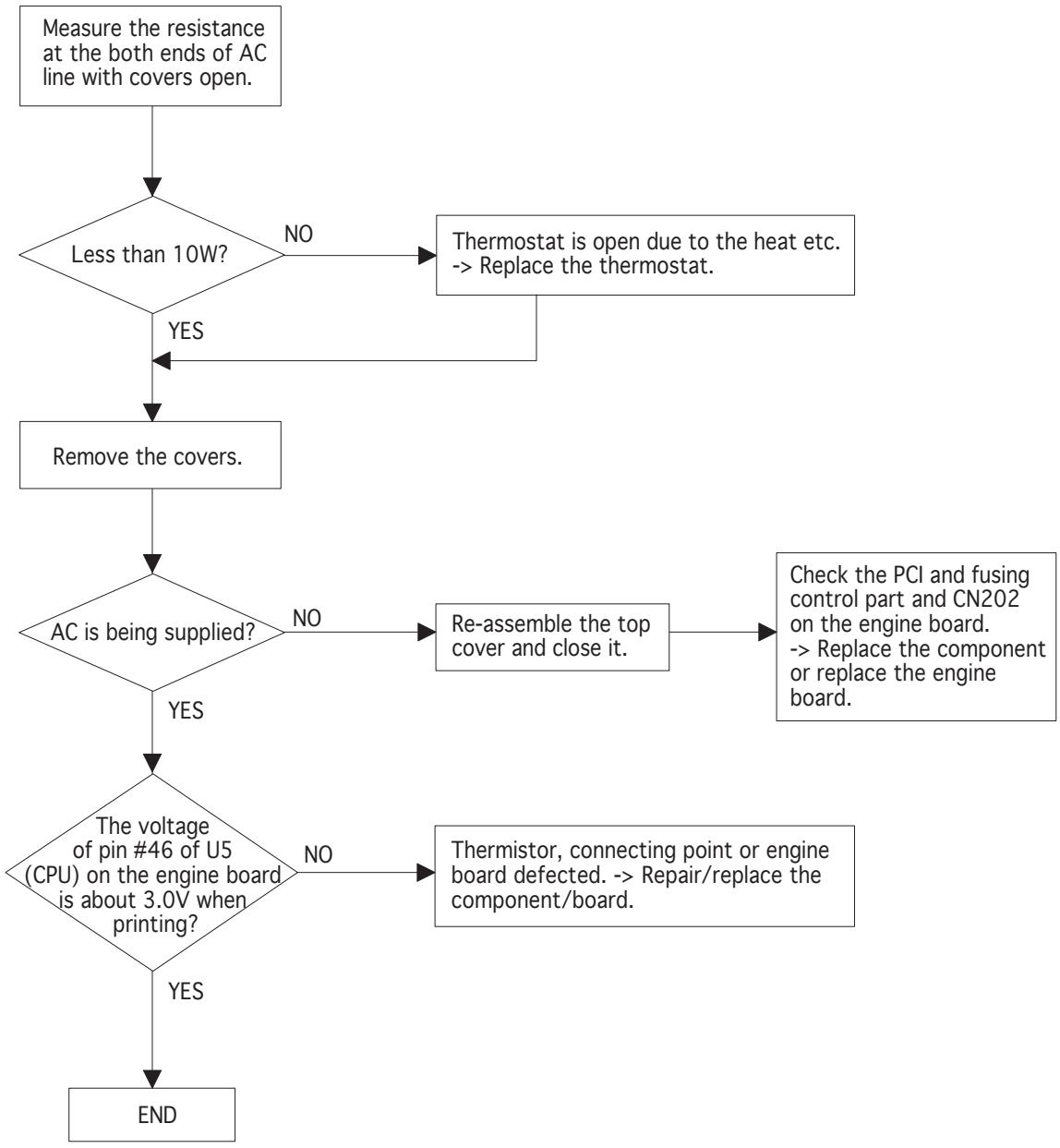

After printing completed, any error related fuser?
NO
The machine placed under the severe low tempera-ture for a long time?
NO
While printing, the voltage of pin 46 of U5 (CPU) on engine board is 2.7V - 3.0V?
NO
Thermistor's contact is OK?
NO
YES
YES
YES
YES
Re-assemble thermistor.
Place the machine at normal temperature and re-test.
Both ends of thermostat open?
NO
YES
Replace thermostat and re-test.
Replace the contol component on engine board.
Check any contact problem in thermistor and repair.
Open the top cover. When black printing, is the fuser NIP width is 3.0-3.5mm?
NO
Check if the hardness of P/R, and spring force is OK? (hardness: 24 degree, spring's force: 3 Kg)
YES
The paper used is too thick or contains too much cotton in it.
-> Re-test with the recommended paper.

4-3 Malfunction

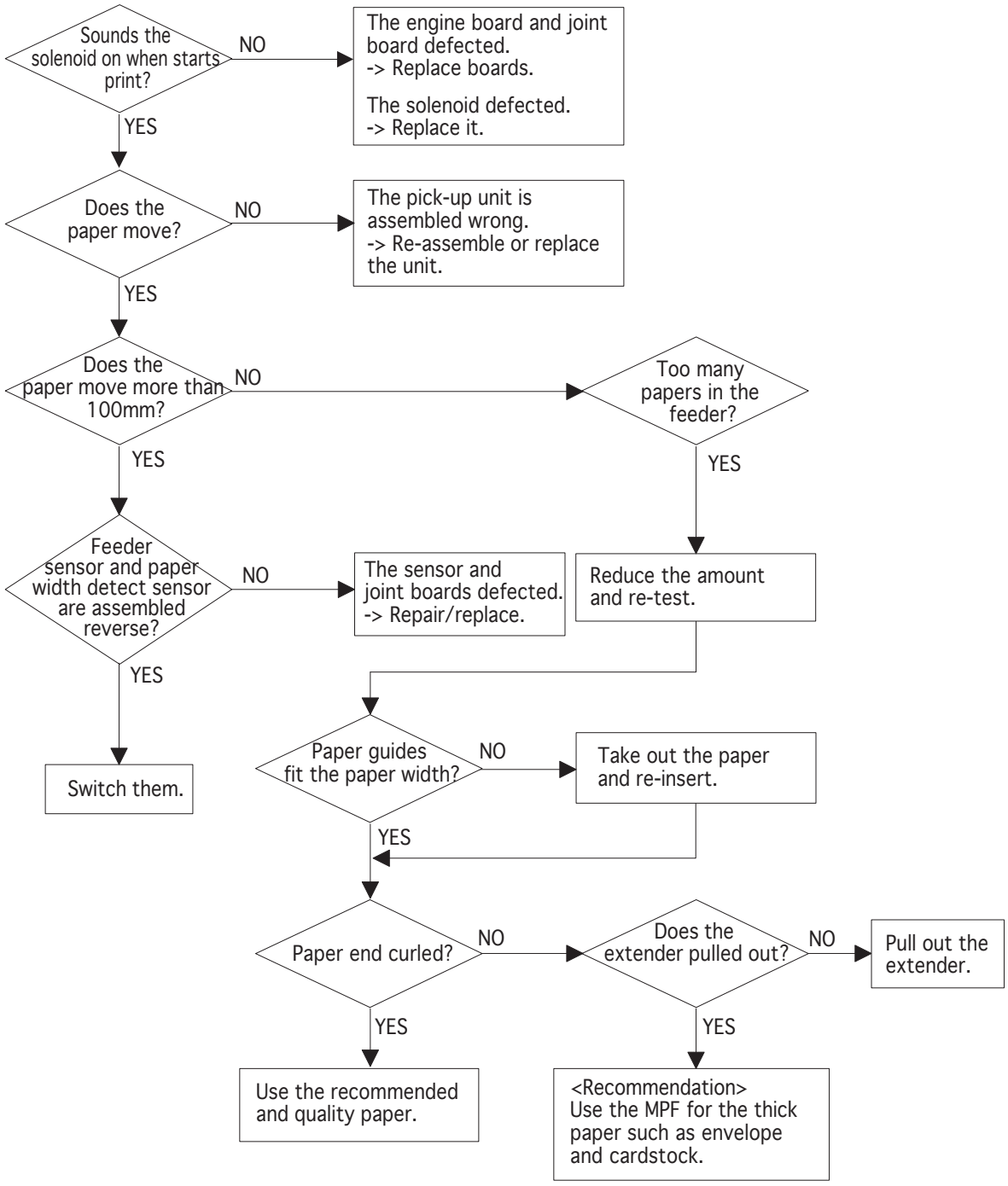
4-3-1 No Power (LED Off)


Plug in the power cord?
NO
Check the voltage first and plug the power cord.
YES
The power voltage supplying is the same as rating?
NO
Supply the power as the rating.
YES
The fan revolves when powered on?
NO
Connections on board are OK?
NO
Re-connect firmly and re-test.
YES
YES
LEDs blink once when powered on?
NO
Fuse of SMPS is open?
NO
Replace the fuse.
YES
YES
The On-Line key is being pressed or shortage on the panel board?
NO
The connection error between controller board and panel board or malfunction of boards.
-> Replace the boards.
Shortage between 5V and GND, or between 24V and GND?
NO
Toner cartridge is in the set?
NO
Put in the cartridge.
YES
YES
YES
Repair/replace the board.
Remove the shortage or replace the board.
Detect failure due to the board which detects top cover open or switch error.
-> Replace the board or switch.

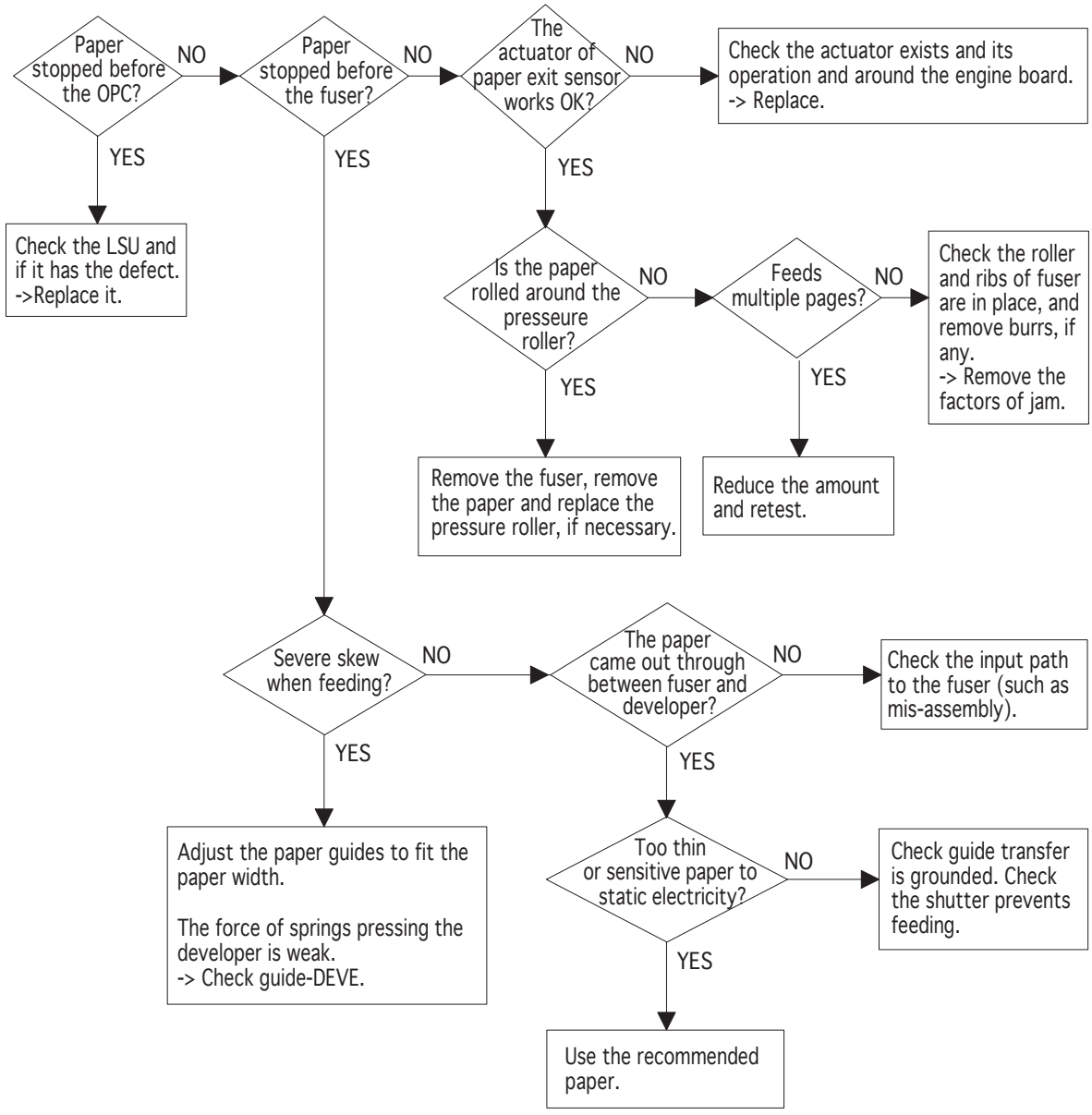
4-3-2 Fuser Error


Measure the resistance at the both ends of AC line with covers open.
Less than 10W?
NO
Thermostat is open due to the heat etc. -> Replace the thermostat.
YES
Remove the covers.
AC is being supplied?
NO
Re-assemble the top cover and close it.
Check the PCI and fusing control part and CN202 on the engine board. -> Replace the component or replace the engine board.
YES
The voltage of pin #46 of U5 (CPU) on the engine board is about 3.0V when printing?
NO
Thermistor, connecting point or engine board defected. -> Repair/replace the component/board.
YES
END

4-3-3 Paper Jam (Mis-feeding)



4-3-4 Paper Jam (Jam 1)


Paper stopped before the OPC?
NO
Paper stopped before the fuser?
NO
The actuator of paper exit sensor works OK?
NO
Check the actuator exists and its operation and around the engine board.
-> Replace.
YES
YES
YES
Check the LSU and if it has the defect.
->Replace it.
Is the paper rolled around the presseure roller?
NO
Feeds multiple pages?
NO
Check the roller and ribs of fuser are in place, and remove burrs, if any.
-> Remove the factors of jam.
YES
YES
Remove the fuser, remove the paper and replace the pressure roller, if necessary.
Reduce the amount and retest.
Severe skew when feeding?
NO
The paper came out through between fuser and developer?
NO
Check the input path to the fuser (such as mis-assembly).
YES
YES
Adjust the paper guides to fit the paper width.
The force of springs pressing the developer is weak.
-> Check guide-DEVE.
Too thin or sensitive paper to static electricity?
NO
Check guide transfer is grounded. Check the shutter prevents feeding.
YES
Use the recommended paper.

4-4 DCU Control

4-4-1 DCU Setup

DCU is used to diagnose the printer malfunctions. To use DCU, open and remove the Printer's exit cover in front, and remove the bottom cover from left. Connect the DCU harness wire (10 pin-to-4 pin) to CN3 (4 pins) on the control board.

4-4-2 Status Code

Connect the DCU to the printer and turn power on. The DCU display Status Code in the 7 segment LEDs. There are two kinds of Status Codes; Normal and Error. And their codes mean the printer operating status.

NORMAL STATUS CODE

These codes mean paper location on the paper path when the printer is printing, or warming up.

61	Warm up	The printer warms up when the printer is turned on or the cover is closed, or wake from sleep mode.
00~04	Ready(paper type)	The printer is in printable state. The paper type is sensed after one page printing.
20	Print Start	The code is displayed when engine controller is received 'PRINT' command from the video controller.
30	Feed Sensor On	It means that paper is passing the feed sensor.
40	Feed Sensor Off	It means that paper passed the feed sensor.
50	Paper out	It means that paper passed the exit sensor.
69	Sleep Mode	It means that the printer fuser is turned off, and the power consumption is minimized.

ERROR STATUS CODE

If the printer stops printing by any malfunction, the DCU displays its error status code.

60,62,68	Fuser Error	These codes mean the fuser error status. Heat lamp, thermistor, thermostat open or thermistor short. The 'Low Temperature Error' is checked when the printer is printing.
64	Cover Open	The printer cover open or no toner cartridge in the machine.
70	No Paper	The paper is not loaded in the printer paper tray.
71	Paper Jam 0	Displays when the paper leading edge stops between the pick-up unit and the feed sensor.
72	Paper Jam 1	Displays when the paper leading edge stops between the feed sensor and the exit sensor.
73	Paper Jam 2	Displays when the paper leading edge stops after the exit sensor.
95	LSU Not Ready	The LSU scanner motor is not ready or 'Hsync' signal is not output.

4-4-3 Diagnostic Mode

When the printer malfunction occurs and DCU displays Error Status Code, you can use the Diagnostic Mode to find a problem and fix it.

DIAGNOSTIC CODE

When you fix the malfunction, you can make only a unit of machine operated in Diagnostic mode. To enter Diagnostic mode, push three buttons ([DOWN], [SHIFT], [STOP]) simultaneously and turn the printer power on. When the DCU displays '78', release the keys in 2-3 seconds, then the DCU displays '00'. By using [UP] or [SHIFT] and [DOWN] keys, select the desired Diagnostic Code, and push the [ENTER] key to perform the operation. To stop its operation, push the [SHIFT] and [ENTER] buttons.

00	MAIN MOTOR OPERATING SYSTEM Only main motor turns continuously.
01	MAIN HIGH VOLTAGE ON There is output of -1400V to MHV terminal.
02	TRANSFER HIGH VOLTAGE (-) ON There is output of -800V to THV terminal.
03	THV (+) REFERENCE ON There is output of +800V to THV terminal.
04	DEV/SUPPLY HIGH VOLTAGE & PTL ON There are output DEV and SUPPLY high voltage to each HV terminals, the PTL lights. At this time, the left one of three LEDs (Diagnostic Mode Indicator) in the DCU lights, and DEV HV is -300V. To change this voltage, push the [UP] button, and two (center and right) of three LEDs light, there are output -350V to DEV HV terminal.
05	LSU OPERATING SYSTEM The scanning motor in LSU turns and the right one of three LEDs lights. To check the LD (Laser Diode) in the LSU at this state, push the [UP] button, the LD is driven, and the center LED lights. If the LD is normal, all three LEDs light.
06	PICKUP CLUTCH ON The solenoid in machine operate. To release the solenoid, push the [SHIFT] and [ENTER] buttons.
07	PEMPTY/PWIDTH/NEW CRU SENSOR TEST When you make the actuator of PEMPTY/PWIDTH sensor operate, the left or right one of three LEDs lights. If you set new CRU in the machine in this mode, the right LED lights.
08	FEED & EXIT SENSOR TEST The feed & exit sensor also can be tested by the same method of the code '06'.

09	COVER OPEN SENSOR TEST Same method of the code '06'.
10	FUSER TEST When you push the [ENTER] button, the right LED lights, and the fuser temperature raises to Ready. If you push the [UP] button, the center LED lights, and it raises to printing temperature. When you push the [UP] button once more, the left LED lights, and it raises overheating temperature.
11	HOT BURN TEST When you push the [ENTER] button in this code, the machine prints endlessly without any sensing operation. To stop this operation, turn the printer power off.
12	CLEANING MODE PRINT The machine prints one page to clean the OPC drum in CRU.
13	THV (+) TRIGGER, ALL HV & FAN ON There are all output of high voltages to each HV terminal, and the LSU/FAN operate. In this mode, the engine controller senses electric resistance of the transfer roller, and output transfer high voltage corresponding to it. If there isn't CRU in the machine, THV output is +199V ~ +2100V.
14	THV(+) REFERENCE ON If you push the [ENTER] button in this mode, there is output -800V(±10V) to the THV terminal.

4-4-4 Self Test Button

When you push this button, the machine prints 'vertical line' pattern while it is pushed.

When you push this button and turn the Printer power on, the DCU displays code '89', and the Printer warms up. After warmed up, it is in 'Ready' state, and code '88' is displayed in DCU. In this mode, the machine does all printing operation (demo page printing and printing the data from PC) without all sensor operating. If you diagnose the control board with malfunction printer engine, this mode is very useful.

5. Exploded Views and Parts List

5-1 Main Exploded View

5-2 Main Parts List

5-3 Front Cover Exploded View

5-4 Front Cover Parts List

5-5 Top Cover Exploded View

5-6 Top Cover Parts List

5-7 Fuser Exploded View

5-8 Fuser Parts List

5-9 Frame Exploded View

5-10 Frame Parts List

5-11 Feeder (1/2) Exploded View

5-12 Feeder (1/2) Parts List

5-13 Feeder (2/2) Exploded View

5-14 Feeder (2/2) Parts List

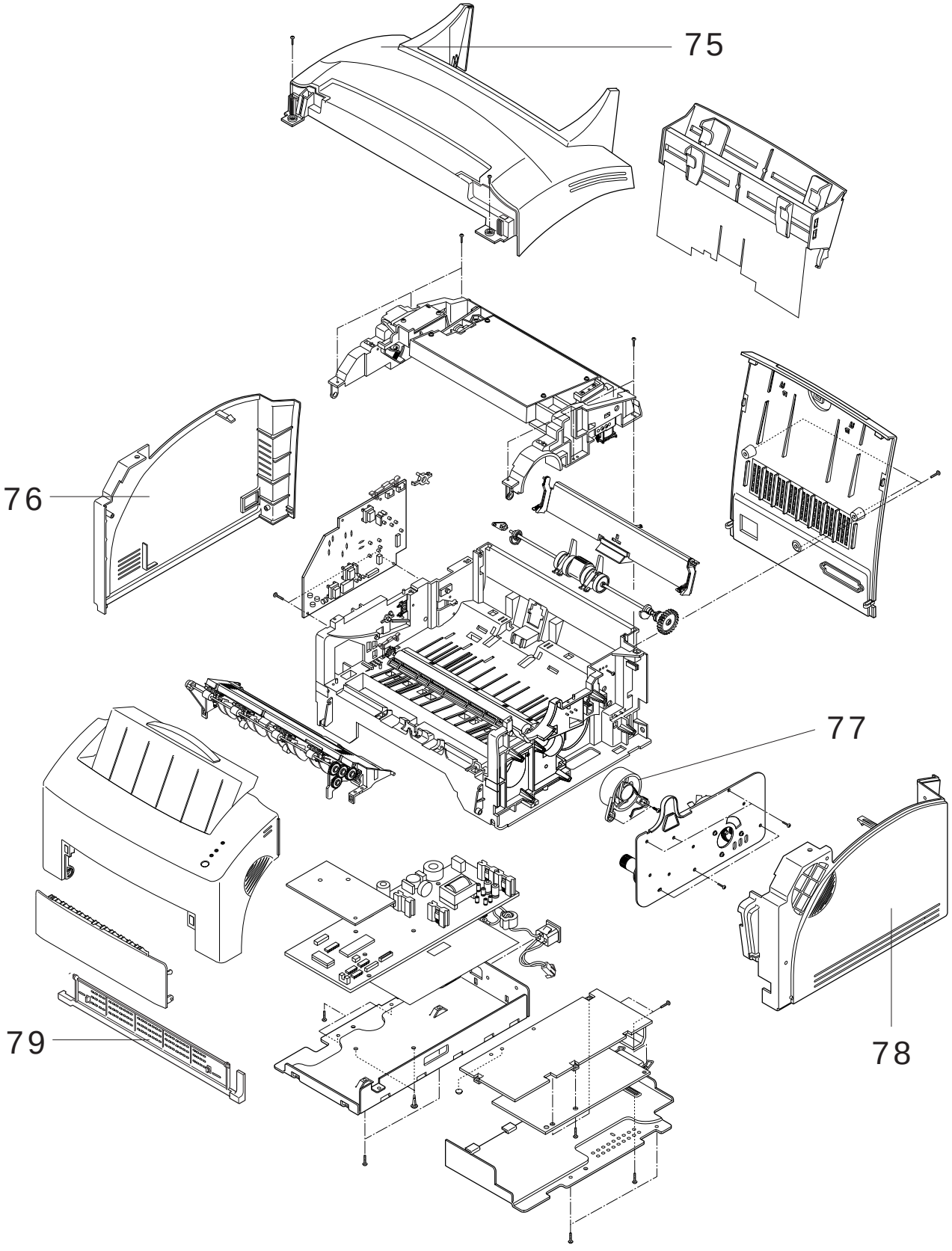
5-15 Motor Exploded View

5-16 Motor Parts List

5-17 PCB Exploded View

5-18 PCB Parts List

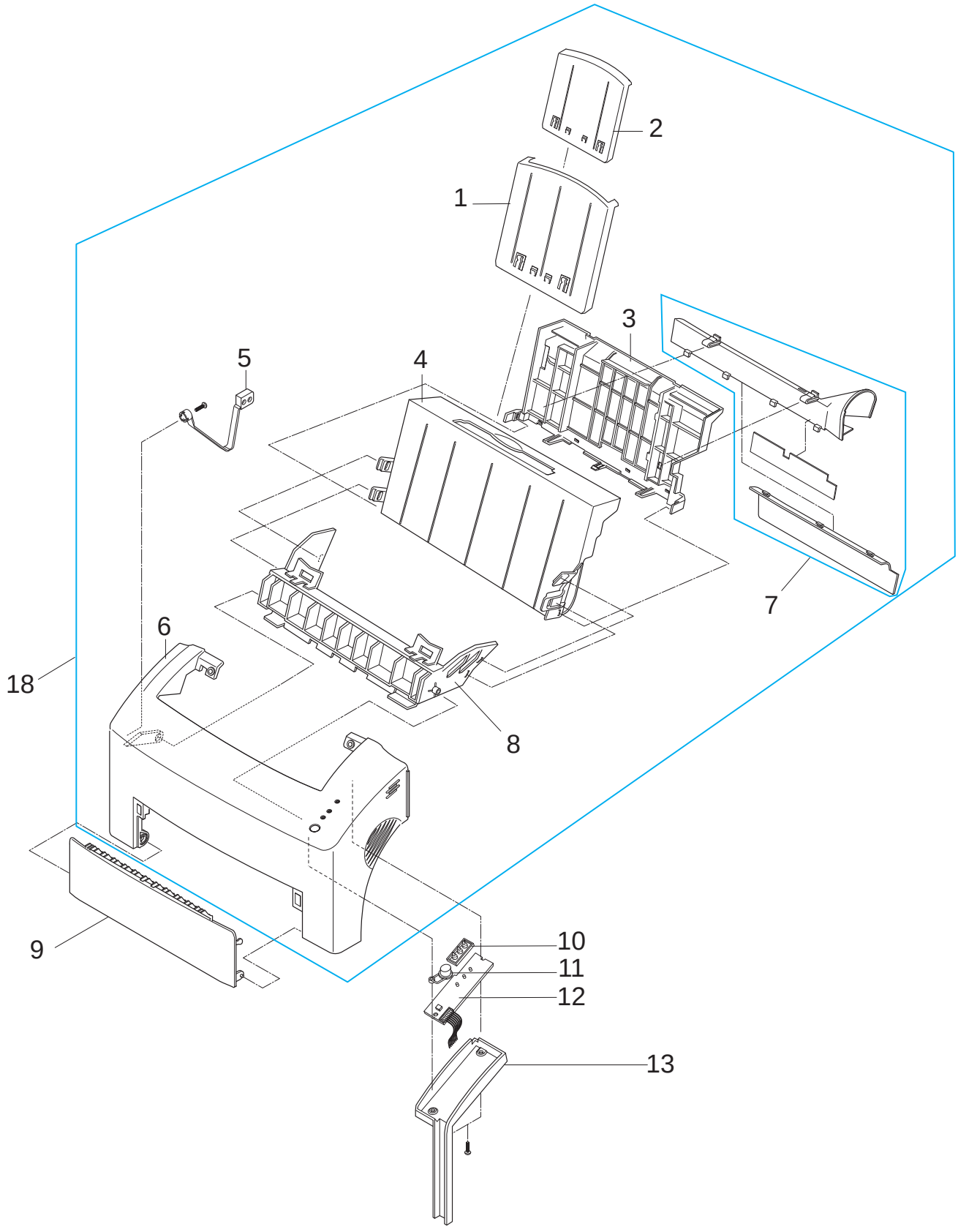
5-1 Main Exploded View



5-2 Main Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
75	COVER TOP	JC72-41279A	1	
76	COVER SIDE,L	JC72-41086C	1	
77	DC FAN MOTOR	JC31-30502A	1	
78	COVER SIDE,R	JC72-41087C	1	
79	COVER-BOTTOM	JC72-41089C	1	

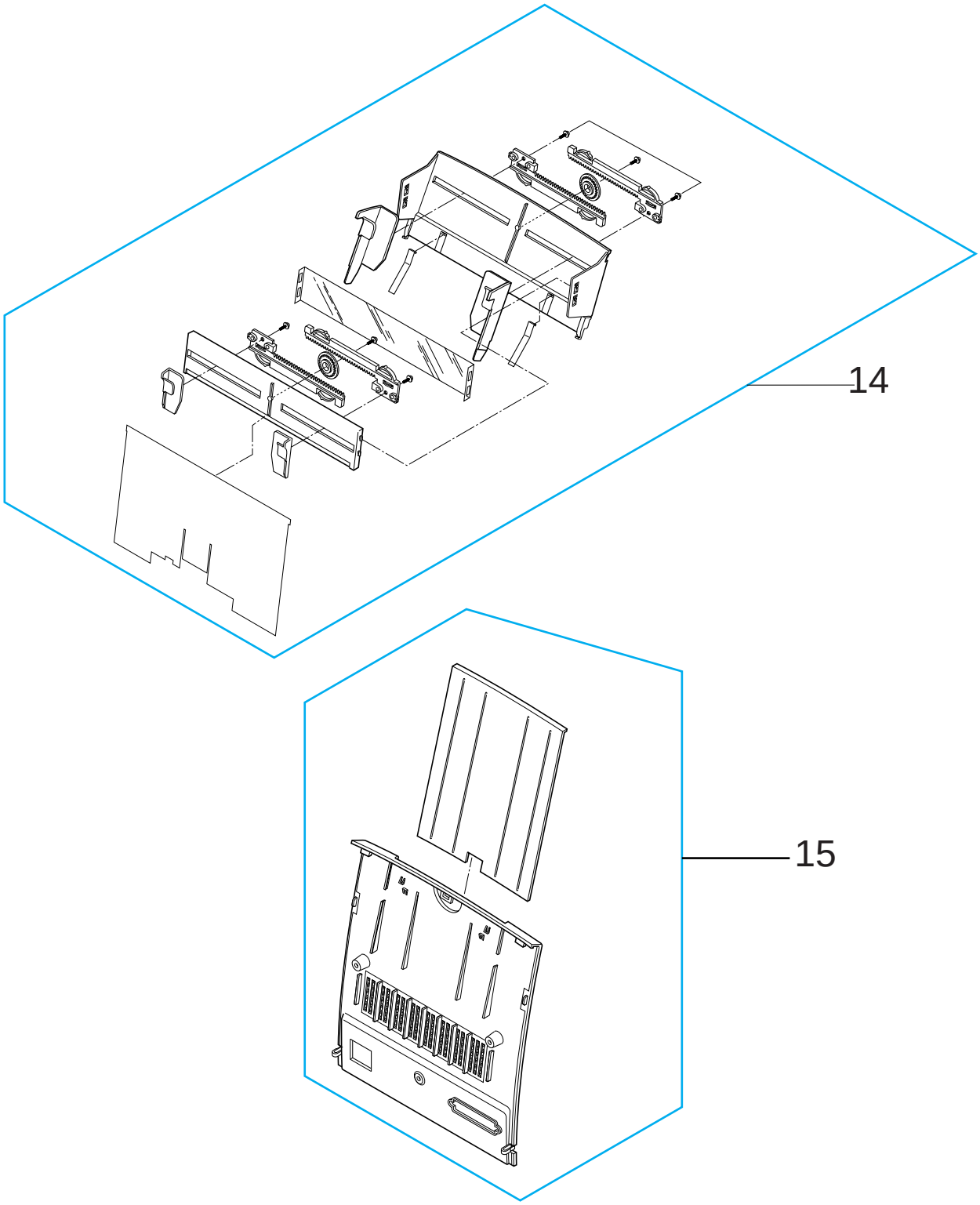
5-3 Front Cover Exploded View



5-4 Front Cover Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
1	STACKER(RX)	JC72-41270A	1	
2	STACKER-EXTEND	JC72-41278A	1	
3	COVER-STACKER	JC72-41267A	1	
4	FRAME-STACKER	JC72-41268A	1	
5	STOPPER	JC72-41170A	1	
6	COVER-FRONT	JC72-41265A	1	ML-5000A
6	COVER-FRONT	JC72-41265C	1	ML-5000G
7	DUCT	JC97-01219B	1	
8	GUIDE-STACKER	JC72-41269A	2	
9	COVER-EXIT	JC72-41276A	1	
10	LED	JC72-41263A	1	
11	KEY	JC72-41262A	1	
12	PBA-PANEL	JC92-01059A	1	
13	COVER-PCB	JC72-41275A	1	
18	ASSY-COVER FRONT	JC96-01214A	1	

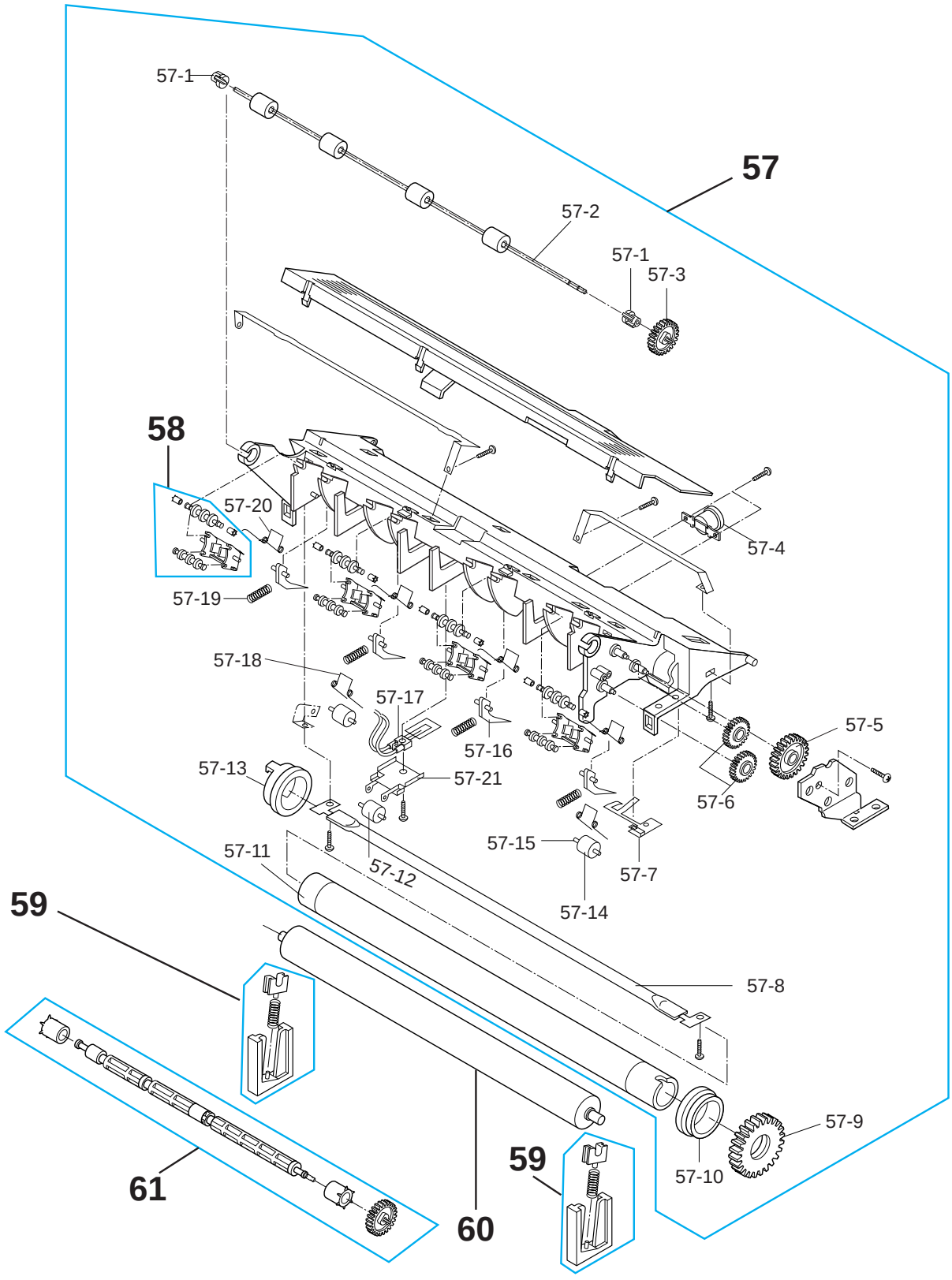
5-5 Top Cover Exploded View



5-6 Top Cover Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
14	MEA-UNIT TRAY	JC97-01135C	1	
15	MEA UNIT-COVER REAR	JC97-01154A	1	

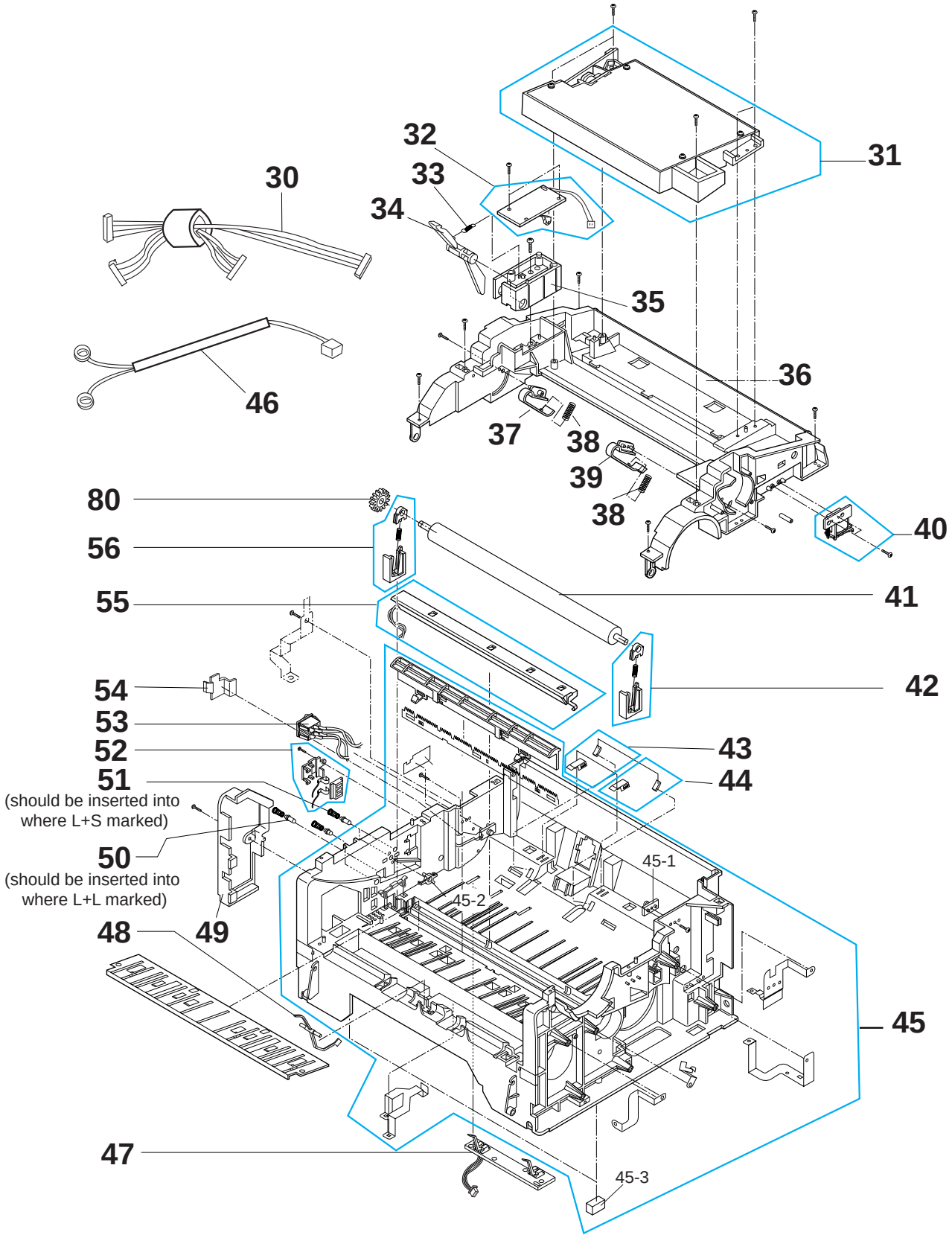
5-7 Fuser Exploded View



5-8 Fuser Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
57	ELA-UNIT FUSER	JC96-01202A	1	220V
		JC96-01204A	1	110V
57-1	BEARING-EXIT	JC75-10968A	1	
57-2	UNIT EXIT F/DOWN	JC66-10200A	2	
57-3	GEAR-EXIT(18)	JC66-40956A	1	
57-4	THERMOSTAT	4712-000001	1	
57-5	GEAR-IDLE2(Z19)	JC66-40945A	1	
57-6	GEAR-IDLE3(Z14)	JC66-40946A	2	
57-7	GROUND-PLATE,FU	JC70-11003A	1	
57-8	LAMP-HALOGEN	4713-001080	1	220V
		4713-001081	1	110V
57-9	GEAR-FUSER	JC66-40379A	1	
57-10	BEARING-H/R,L	JC66-10203A	1	
57-11	HEAT-ROLLER	JC71-20903A	1	
57-12	ROLLER-EXIT,F/UP	JC72-20901A	2	
57-13	BEARING-H/R,R	JC66-10207A	1	
57-14	ROLLER-F/UP(2)	JC72-20902A	2	
57-15	SHAFT-IDLE, F/UP	JC70-20901A	1	
57-16	GUIDE-CLAW	JC72-41128A	4	
57-17	THERMISTOR	1404-001128	1	
57-18	SPRING-EXIT,F/UP	JC61-70936A	2	
57-19	SPRING-ES	JC61-70962A	4	
57-20	SPRING-EXIT,F/DOWN	JC61-70937A	4	
57-21	SPRING-IDLE FU	JC70-11066A	1	
58	REDRIVE	JC97-01223A	4	
59	MEA ETC-HOLDER P/R	JC97-01204A	2	
60	ROLLER-PRESSURE	JC75-10981A	1	
61	MEA ETC-ROLLER EXIT	JC97-01126A	1	

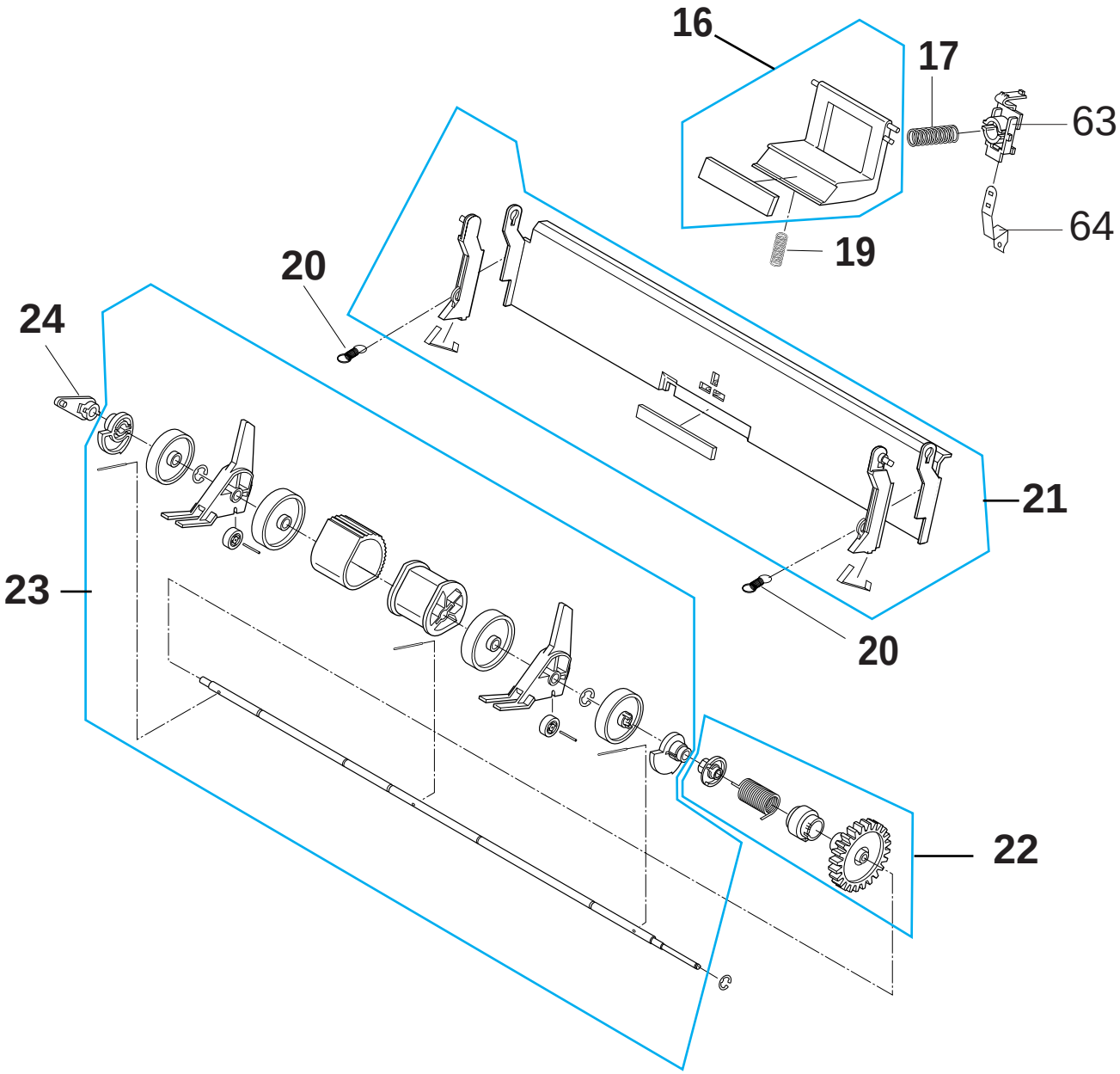
5-9 Frame Exploded View



5-10 Frame Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
30	PRINTHEAD TO HVPS	JC39-40583A	1	
31	UNIT-LSU	JC59-10505A	1	
32	COVER OPEN SENSOR	JC92-01081A	1	
33	SPRING-C/O	JC61-70931A	1	
34	ACTUATOR-C/O	JC72-41134A	1	
35	COVER-C/O	JC72-41139A	1	
36	FRAME BASE UPPER	JC72-41141A	1	
37	CAP PLATE,G/DEVE L	JC72-41173A	1	
38	SPRING-G/DEVE	JC61-70932A	2	
39	CAP PLATE,G/DEVE R	JC72-41135A	1	
40	SOLENOID	JC33-10004A	1	
41	ROLLER-TRANSFER	JC75-10963A	1	
42	MEA UNIT-HOLDER TR R	JC97-01112A	1	
43	MEA-UNIT SEPARATE(L)	JC97-01133A	1	
44	MEA-UNIT SEPARATE(R)	JC97-01134A	1	
45	MEA-UNIT FRAME LOWER	JC97-01123A	1	
45-1	HOLDER SPRING	JC72-41156A	2	
45-2	GUIDE BOSS DEVE	JC72-41243A	1	
45-3	RUBBER FOOT	JC73-10926A	2	
46	FUSER LAMP	JC39-40550A	1	
47	ASSY-FEED SENSOR	JC92-01017A	1	
48	ACTUATOR-EXIT	JC72-41130A	1	
49	COVER WIRE FU	JC72-41138A	1	
50	MEA UNIT-TERMINAL TR	JC97-01113A	1	
51	MEA UNIT-TERMINAL L	JC97-01114A	3	
52	ELA UNIT FUSE DEVE	JC96-01117A	1	
53	POWER SWITCH	JC39-40585A	1	
54	PICK ROLLER ACCESS	JC72-41244A	1	
55	ELA UNIT-PTL	JC96-01190A	1	
56	MEA UNIT-HOLDER TR L	JC97-01160A	2	
80	TRANSFER GEAR	JC66-40943A	1	

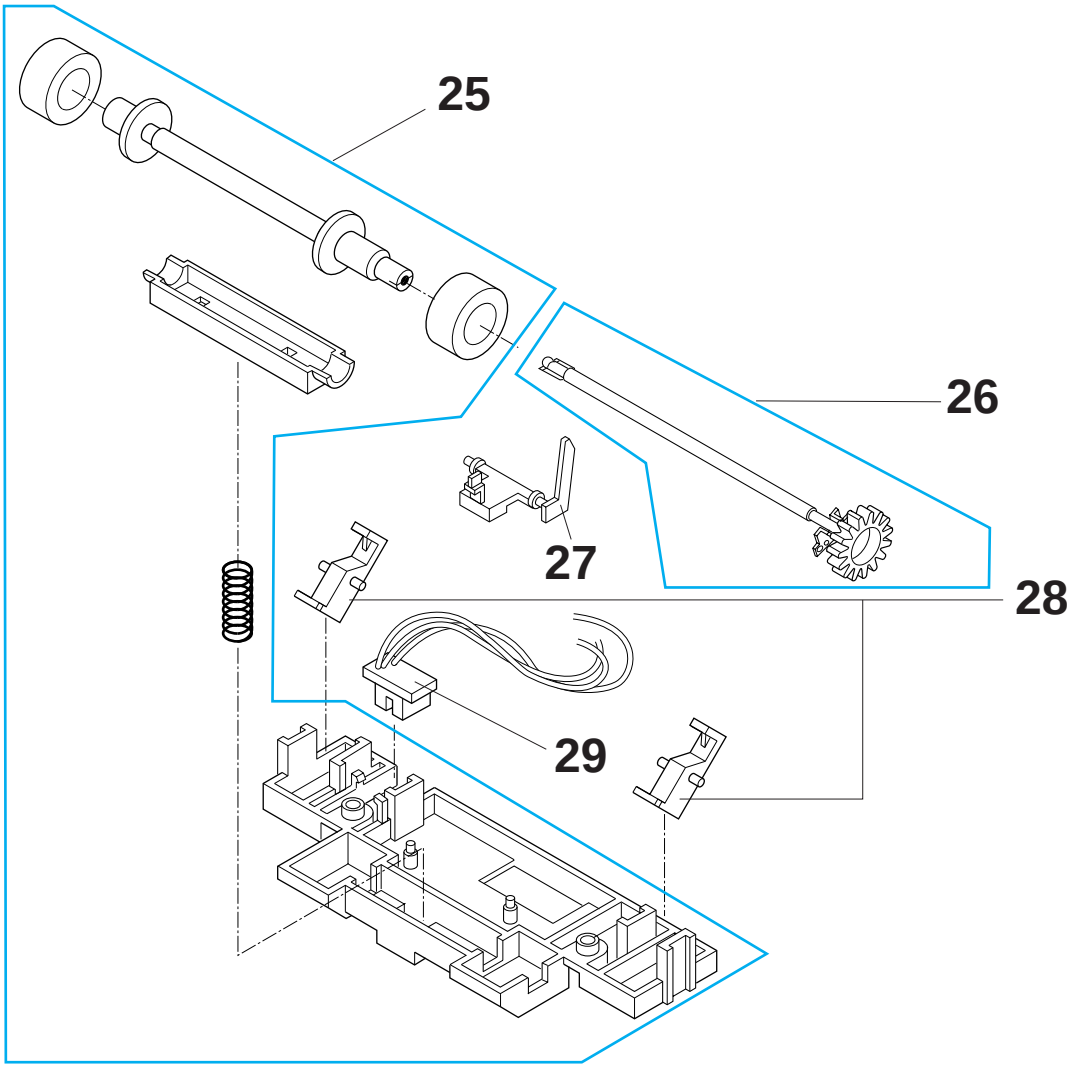
5-11 Feeder (1/2) Exploded View



5-12 Feeder (1/2) Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
16	MEA UNIT-SEPARATE	JC97-01132A	1	
17	SPRING-KNOCK UP	JC61-70934A	1	
18	HOLDER K/SPRING ASS'Y	JC97-01169A	1	
19	SPRING-SEPARATE	JC61-70935A	1	
20	SPRING-EXTENSION	JC61-70950A	2	
21	MEA UNIT-KNOCK UP	JC97-01127A	1	
22	MEA UNIT-CLUTCH	JC97-01129A	1	
23	MEA UNIT-PICK UP	JC97-01130A	1	
24	BUSHING SHAFT LOCK	JG72-40849A	1	
63	HOLDER SPRING K-UP	JC72-41153A	1	
64	GROUND K-UP	JC70-11016A	1	

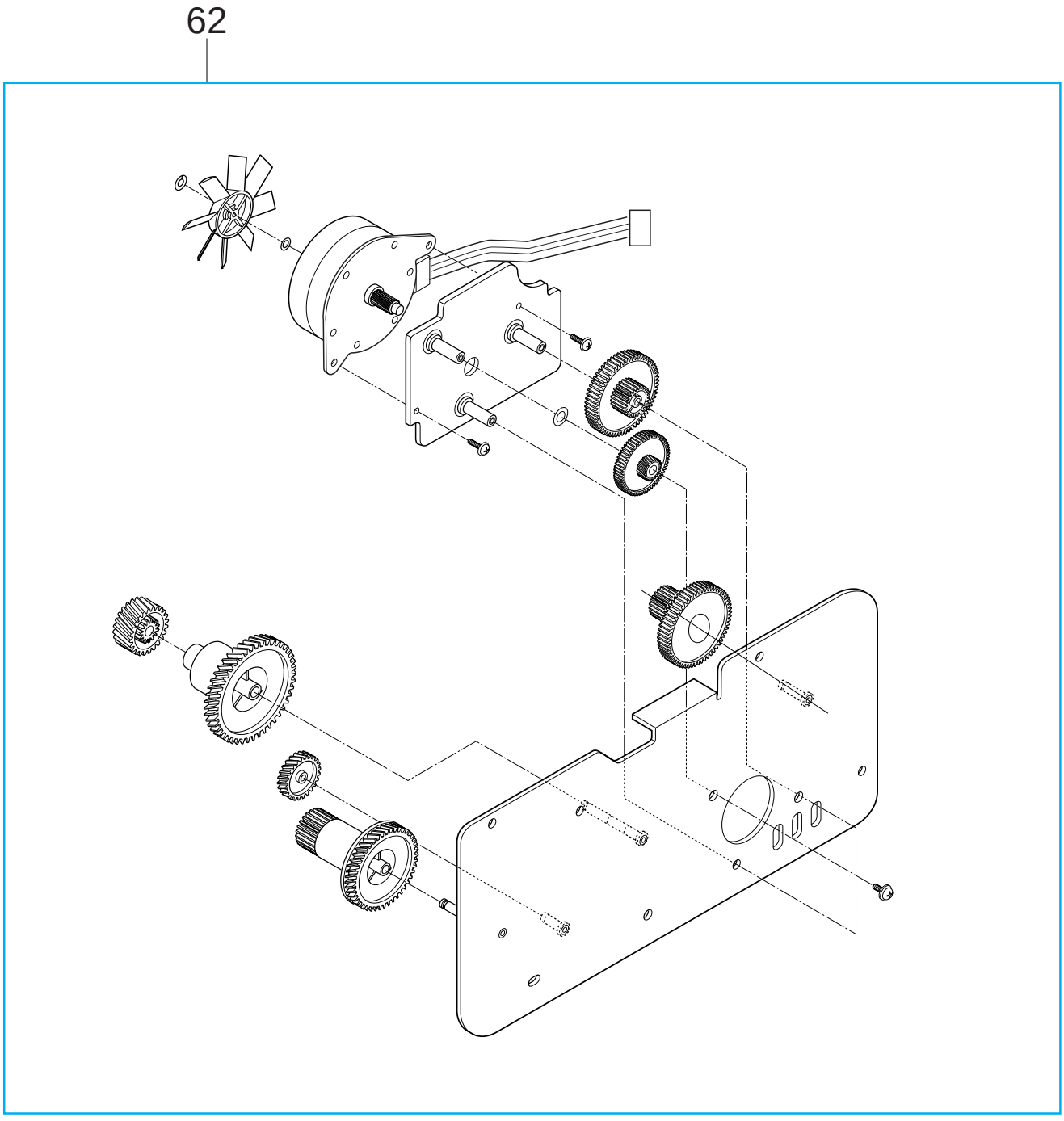
5-13 Feeder (2/2) Exploded View



5-14 Feeder (2/2) Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
25	MEA UNIT-FRAME SUP	JC97-01128A	1	
26	MEA-UNIT GEAR FEED	JC97-01131A	1	
27	ACTUATOR EMPTY	JC72-41151A	1	
28	SEPARATE PAPER	JC72-41155A	2	
29	ASSY-P.EMPTY	JC92-01044A	1	

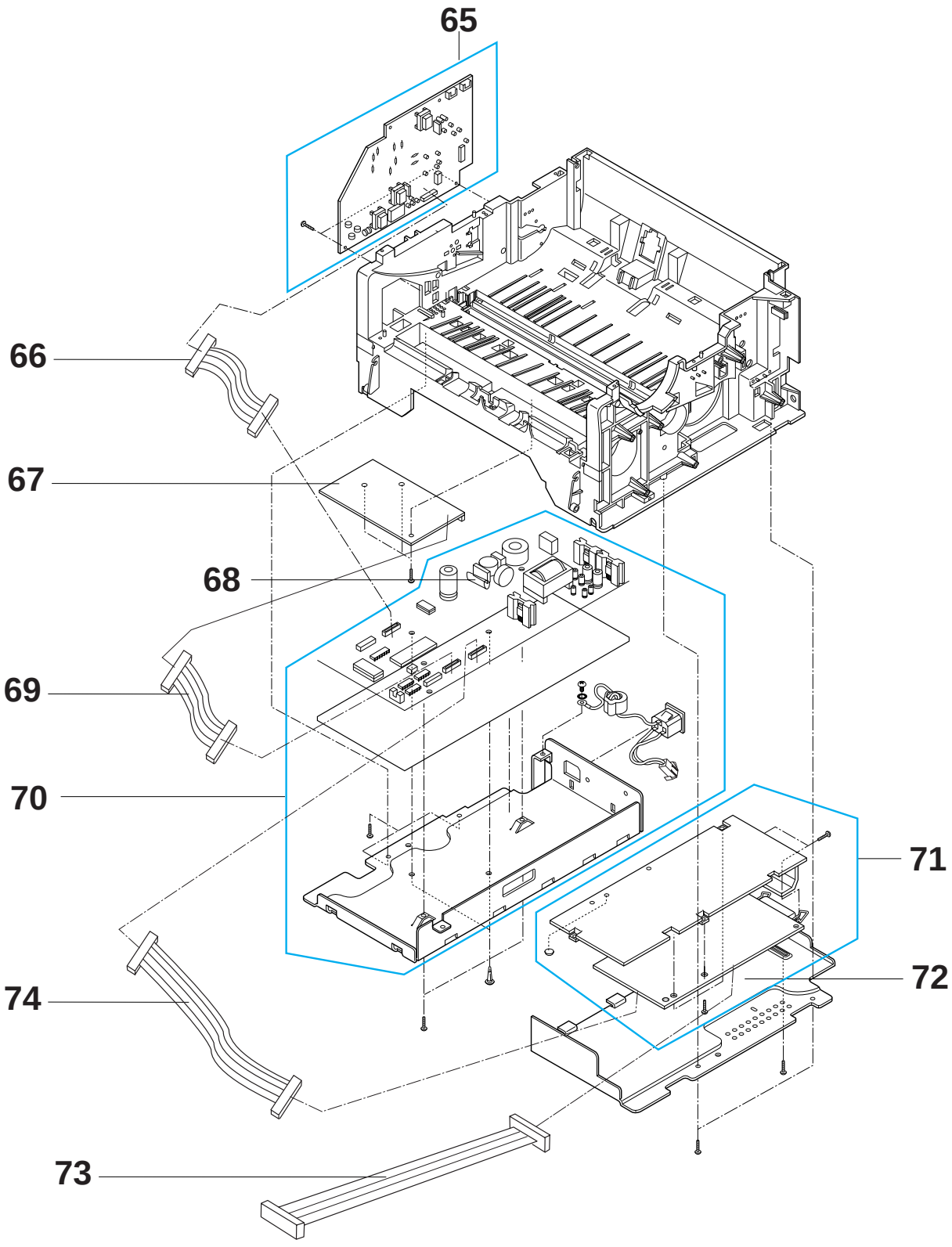
5-15 Motor Exploded View



5-16 Motor Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
62	ELA-UNIT MOTOR	JC96-01200A	1	

5-17 PCB Exploded View



5-18 PCB Parts List

NO	DESCRIPTION	SEC. CODE	Q'TY	REMARK
65	PBA SUB-HVPS	JC92-01002A	1	
66	ENGINE TO HVPS	JC39-40558A	1	
67	JOINT-B/D	JC92-01001A	1	
68	FUSE(V2) 250VAC T5A	3601-000002	1	220V
		3601-000157	1	110V
69	ENGINE TO JOINT	JC39-40564A	1	
70	PBA MAIN-ENGINE	JC92-01000A	1	220V
		JC92-00999A	1	110V
71	CONTROLLER	JC96-01222A	1	A4
		JC96-01222B	1	LETTER
72	SIMM ACCESS	JC70-11015A	1	
73	OPERATOR PANEL	JC39-40579A	1	
74	ENGINE TO CONTROLLER	JC39-40548A	1	ML-5000A
74	ENGINE TO CONTROLLER	JC39-40599A	1	ML-5000G

Memo

6. Electrical Parts List

6-1 Controller Board (ML-5000A)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
	JC92-00986A	PBA MAIN-CONTROLLER;ML-5000A,XEROX,USA,110V/220V,*	-
OSC1	2804-000349	OSCILLATOR-CLOCK;66MHz,100ppm,10 TTL,BK,5V,45mA	1
OSC2	2804-001176	OSCILLATOR-CLOCK;28.6925MHz,100ppm,10 TTL & CMO	1
J1	3702-000118	CONNECTOR-RIBBON;36P,FEMALE,ANGLE,AU	1
J7	3709-000177	CONNECTOR-CARD EDGE;72P,1.27mm,ANGLE,SN	1
J2	3711-001091	CONNECTOR-HEADER;BOX,7P,1R,2.5mm,STRAIGHT,SN	1
J5	3711-003204	CONNECTOR-HEADER;BOX,24P,2R,2mm,STRAIGHT,SN	1
-	0202-000001	SOLDER-CREAM;RMA2007,-,-,63Sn/37Pb,-	0.001
U35	0803-000117	IC-TTL;74F14,INVERTER,SOP,14P,150MIL,	1
U36	0803-000207	IC-TTL;74F08,AND GATE,SOP,14P,150MIL,	1
U34	0803-000274	IC-TTL;74F32,OR GATE,SOP,14P,150MIL,Q	1
U33	0803-003058	IC-TTL;74F1071,ESD,SOP,20P,-,-,TP,PLA	1
U1	0903-001126	IC-MICROCONTROLLER;32C6100,32BIT,QFP,208P,-,33MHz	1
U12	1103-000133	IC-EEPROM;93C66,256x16BIT,SOP,8P,150MIL,	1
U3,U4	1105-000191	IC-DRAM;416C120,-,-,-,-,70nS,5V,-,-,0t	2
U31(H),U32(L)	1107-001077	IC-FLASH MEMORY;29F800,512Kx16BIT,SOP,44P,512M	2
U30	1203-000346	IC-VOL. SUPERVISORY;7705,SOP,8P,150MIL,PLASTIC,20V	1
R144,R146,R147,R159	2007-000029	R-CHIP;0OHM,5%,1/10W,DA,TP,2012	4
R99,R121,R122,R123,R124	2007-000029	R-CHIP;0OHM,5%,1/10W,DA,TP,2012	5
R60,R61,R62,R63,R64,R65	2007-000290	R-CHIP;100OHM,5%,1/10W,DA,TP,2012	6
R133,R134	2007-000300	R-CHIP;10KOHM,5%,1/10W,DA,TP,2012	2
R43,R44,R45,R46,R47,R48,R49,R50, R51,R52	2007-000300	R-CHIP;10KOHM,5%,1/10W,DA,TP,2012	10
R143,R34	2007-000308	R-CHIP;10OHM,5%,1/10W,DA,TP,2012	2
R35,R72,R73,R74,R75,R76,R77,R79	2007-000308	R-CHIP;10OHM,5%,1/10W,DA,TP,2012	8
R55,R56,R57,R58,R66,R67,R68,R69, R70,R71	2007-000308	R-CHIP;10OHM,5%,1/10W,DA,TP,2012	10
R80,R83,R131,R132	2007-000308	R-CHIP;10OHM,5%,1/10W,DA,TP,2012	4
R120	2007-000449	R-CHIP;180OHM,5%,1/10W,DA,TP,2012	1
R102,R103,R104,R105,R106,R107, R108,R114	2007-000468	R-CHIP;1KOHM,5%,1/10W,DA,TP,2012	8
R115,R116,R130,R139,R140,R149	2007-000468	R-CHIP;1KOHM,5%,1/10W,DA,TP,2012	6
R53,R97,R98,R101	2007-000468	R-CHIP;1KOHM,5%,1/10W,DA,TP,2012	4
R129	2007-000493	R-CHIP;2.2KOHM,5%,1/10W,DA,TP,2012	1

Controller Board (ML-5000A)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
R1,R2,R3,R4,R5,R6,R7,R8,R9,R10, R11,R12	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	12
R127,R128,R135,R142	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	4
R13,R14,R15,R16,R17,R18, R19,R20,R21,R22	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	10
R150,R153,R154	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	3
R23,R24,R25,R26,R27,R28, R29,R30,R31,R32	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	10
R33,R87,R88,R89,R90,R91, R92,R93,R94	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	9
R36,R37,R38,R39,R40,R59	2007-000781	R-CHIP;33OHM,5%,1/10W,DA,TP,2012	6
R42	2007-000931	R-CHIP;470OHM,5%,1/10W,DA,TP,2012	1
R109,R110,R111,R112,R113	2007-000964	R-CHIP;5.1KOHM,5%,1/10W,DA,TP,2012	5
R96	2007-001001	R-CHIP;510OHM,5%,1/10W,DA,TP,2012	1
R126	2007-001133	R-CHIP;68OHM,5%,1/10W,DA,TP,2012	1
R84,R95,R125	2007-001133	R-CHIP;68OHM,5%,1/10W,DA,TP,2012	3
C17,C18,C19,C20,C21,C22, C23,C24,C25,C42	2203-000192	C-CERAMIC,CHIP;100nF,+80-20%,50V,Y5V,TP,2012,	10
C177,C182,C183,C184,C185, C186,C187,C188	2203-000192	C-CERAMIC,CHIP;100nF,+80-20%,50V,Y5V,TP,2012,	8
C32,C33,C34,C35,C36,C37	2203-000192	C-CERAMIC,CHIP;100nF,+80-20%,50V,Y5V,TP,2012,	6
C46,C47,C160,C181,C189, C192	2203-000192	C-CERAMIC,CHIP;100nF,+80-20%,50V,Y5V,TP,2012,	6
C6,C7,C8,C9,C10,C11,C12, C13,C14,C15,C16	2203-000192	C-CERAMIC,CHIP;100nF,+80-20%,50V,Y5V,TP,2012,	11
C109,C110,C111.C112, C128,C129,C130	2203-000239	C-CERAMIC,CHIP;100pF,5%,50V,NPO,TP,2012,-	7
C163,C164,C168,C169, C170,C171,C172,C173	2203-000239	C-CERAMIC,CHIP;100pF,5%,50V,NPO,TP,2012,-	8
C174,C175,C178,C179, C180	2203-000239	C-CERAMIC,CHIP;100pF,5%,50V,NPO,TP,2012,-	5
C161	2203-000260	C-CERAMIC,CHIP;10nF,10%,50V,X7R,TP,2012,-	1
C51,C52,C53,C54,C55, C56,C57,C58,C59,C60	2203-000429	C-CERAMIC,CHIP;18pF,5%,50V,NPO,TP,2012,-	10
C61,C62,C63,C64,C65, C66,C67,C68,C69,C70	2203-000429	C-CERAMIC,CHIP;18pF,5%,50V,NPO,TP,2012,-	10

Controller Board (ML-5000A)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
C71,C72,C73,C74,C75, C76,C77,C78,C79,C80	2203-000429	C-CERAMIC,CHIP;18pF,5%,50V,NPO,TP,2012,-	10
C81,C82,C83,C84,C85	2203-000429	C-CERAMIC,CHIP;18pF,5%,50V,NPO,TP,2012,-	5
C139,C141,C142	2203-000444	C-CERAMIC,CHIP;1nF,10%,50V,X7R,TP,2012,-	3
C144,C145,C146,C147,C148	2203-000444	C-CERAMIC,CHIP;1nF,10%,50V,X7R,TP,2012,-	5
C120,C121,C157,C158	2203-000634	C-CERAMIC,CHIP;22pF,5%,50V,NPO,TP,2012,-	4
C165,C166,C167,C190	2203-000634	C-CERAMIC,CHIP;22pF,5%,50V,NPO,TP,2012,-	4
C131,C132,C133,C134,C135,C136, C137,C138	2203-000938	C-CERAMIC,CHIP;470pF,5%,50V,NPO,TP,2012,-	8
C108,C176	2203-001002	C-CERAMIC,CHIP;47pF,5%,50V,NPO,TP,2012,-	2.001
C113	2203-001002	C-CERAMIC,CHIP;47pF,5%,50V,NPO,TP,2012,-	1
C107	2203-001158	C-CERAMIC,CHIP;68pF,5%,50V,NPO,TP,2012,-	1
C48,C50,C104,C105	2203-001158	C-CERAMIC,CHIP;68pF,5%,50V,NPO,TP,2012,-	4.001
C162	2404-000128	C-TA,CHIP;10uF,20%,16V,-,TP,6032,-	1
C1,C2,C3,C4,C159,C191	2404-000308	C-TA,CHIP;33uF,20%,10V,-,TP,7342,4.4mm	6
LF1,LF2,LF3,LF4,LF5	2901-000229	FILTER-EMI SMD;50V,300mA,-,22nF,4.5x1.8x3.2mm	5
BD1	3301-001074	CORE-FERRITE BEAD;AB,2.0x1.25x0.9mm,-,-	1
U29	4701-001020	FREQ-ATTENUATOR;5-80MHz,15dB,-,0.03W	1
-	JC41-10525A	PCB-CONTROLLER;ML-5000A,FR-4,2L,T1.6mm,100X18	1

6-2 Engine Board (220V)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
-	JC92-01000A	PBA MAIN-ENGINE;ML-5000A,SEG,GEM,220V,*,137.3X	-
DB201	0402-000104	DIODE-BRIDGE;D3SBA60,600V,4A,-,ST	1
PC252	0604-000142	PHOTO-COUPLER;TR,-,200mW,DIP-4,ST	1
PC1	0604-000146	PHOTO-COUPLER;TRIAC,-,250mW,DIP-6,ST	1
OP3	0604-001033	PHOTO-INTERRUPTER;TR,-,150mW,DIP-4,ST	1
U4	0801-000528	IC-CMOS LOGIC;74HCT574,D FLIP-FLOP,DIP,20P,3	1
U6	0801-000722	IC-CMOS LOGIC;74HC245,TRANSCEIVER,DIP,20P,30	1
U7	0803-001039	IC-TTL;74LS14,SCHIMITT INVERTER,DIP,1	1
U2	0803-001097	IC-TTL;7407,BUFFER/DRIVER,DIP,14P,300	1
U5	0903-000219	IC-MICROCOMPUTER;88C4316,8BIT,DIP,64P,-,8MHz,ST	1
U3	1102-000239	IC-EPROM;27C256,32Kx8BIT,DIP,28P,600MIL	1
U8	1103-000178	IC-EEPROM;9346,1Kx1BIT,DIP,8P,300MIL,400	1
U1	1202-000103	IC-VOLTAGE COMP.;393,DIP,8P,300MIL,DUAL,36V,CMO	1
TH201	1404-000167	THERMISTOR-NTC;5ohm,10%,3150K,18.7mW/C,TP	1
TNR201	1405-000147	VARISTOR;470V,4500A,17x12mm,BK	1
TNR203	1405-000147	VARISTOR;470V,4500A,17x12mm,BK	1
R256	2003-000190	R-METAL OXIDE;1Kohm,2%,2W,AA,TP,6x16mm	1
R252	2003-000333	R-METAL OXIDE;56ohm,5%,2W,AA,TP,6x16mm	1
R208	2006-001051	R-CEMENT;20K,5%,3W,CJ,TP,12.5x9x21mm	1
C203,C204,C215	2201-002071	C-CERAMIC,DISC;2.2nF,20%,400VAC,Y5U,TP,13x7,1	3
C208	2301-000276	C-FILM,PEF;47nF,10%,400V,TP,16.5x10.5x7.5	1
C202	2306-000114	C-FILM,MPPF;100nF,20%,250VAC,BK,18x7.5mm,1	1
C256,C258	2401-000183	C-AL;1000uF,20%,35V,WT,TP,12.5x25,5	2
C207	2401-000534	C-AL;150uF,20%,400V,GP,ST,25x30,10	1
C251	2401-000697	C-AL;2200uF,20%,16V,WT,TP,12.5x25,5	1
C201	2501-000203	C-PAPER;470nF,0.2,250VAC,TP,26x11mm,22	1
X1	2801-000002	CRYSTAL-UNIT;6.94407MHz,50ppm,28-AAM,20pF,5	1
F201	3601-000296	FUSE-FERRULE;250V,5A,TIME LAG,CERAMIC,5x20m	1
U3(SOCKET)	3704-000235	SOCKET-IC;28P,DIP,SN,2.54mm	1
CN201	3711-000217	CONNECTOR-HEADER;1WALL,3P,1R,3.96mm,STRAIGHT,SN	1
CN1	3711-000814	CONNECTOR-HEADER;BOX,2P,1R,2.5mm,ANGLE,SN	1
CN4	3711-002001	CONNECTOR-HEADER;-,20P,2R,2mm,STRAIGHT,SN	1
CN202	3711-002104	CONNECTOR-HEADER;1WALL,2P,1R,7.92mm,STRAIGHT,SN	1
CN2,CN5	3711-003204	CONNECTOR-HEADER;BOX,24P,2R,2mm,STRAIGHT,SN	2
CN3	3711-003205	CONNECTOR-HEADER;BOX,4P,1R,2.0mm,STRAIGHT,SN	1
-	GG68-30817A	LABEL(R)-BAR CODE;SP-R401,PS,-,T4.6,BLK	1
T201	JC26-30505A	TRANS POWER-S/W;ML-5000A,220V,1.1mH	1
L201	JC27-60100A	COIL FILTER-;-,-,110mohm,-	1
L203	JC27-60101A	COIL FILTER-;-,300UH,-,-	1
L251	JC27-60101B	COIL FILTER-;-,9UH,-,-	1
L202	JC27-60101D	COIL FILTER-;-,-,-,-	1
D1,D2,D3,D4,D5,D203	0401-000005	DIODE-SWITCHING;1N4148,75V,300mA,DO-35,TP	6
D202	0402-000012	DIODE-RECTIFIER;UF4007,1KV,1A,DO-41,TP	1
D206	0406-001007	DIODE-TVS;P6KE180A,171/180/189V,600W,CAS	1
Q1,Q2,Q3	0501-000010	TR-SMALL SIGNAL;KSC1008,NPN,800mW,TO-92,TP,120	3
U251	1203-000002	IC-POSI.ADJUST REG.;431,TO-92,3P,-,PLASTIC,2.44/2.	1
R13,R28,R32	2001-000003	R-CARBON;330OHM,5%,1/8W,AA,TP,-	3
R25,R251	2001-000027	R-CARBON;100OHM,5%,1/4W,AA,TP,-	2
R16	2001-000105	R-CARBON;1.5KOHM,5%,1/4W,AA,TP,-	1
R203	2001-000118	R-CARBON(S);180OHM,5%,1/2W,AA,TP,-	1
R29	2001-000221	R-CARBON;1.2KOHM,5%,1/8W,AA,TP,-	1
R17,R24,R41,R42	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,-	4
R44,R45	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,-	2
R1,R47	2001-000331	R-CARBON;12KOHM,5%,1/8W,AA,TP,-	2
R36	2001-000362	R-CARBON;150OHM,5%,1/8W,AA,TP,-	1
R3,R22,R23,R43	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,-	4
R46	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,-	1
R7	2001-000660	R-CARBON;33KOHM,5%,1/8W,AA,TP,-	1
R10	2001-000723	R-CARBON;4.3KOHM,5%,1/8W,AA,TP,-	1
R5,R14	2001-000734	R-CARBON;4.7KOHM,5%,1/8W,AA,TP,-	2
R9	2001-000786	R-CARBON;47KOHM,5%,1/8W,AA,TP,-	1
R20,R21,R26,R27,R50	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	5
R30,R34,R35	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	3

Engine Board (220V)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
R31,R33	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	2
R4,R6,R15,R18,R19	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	5
R210	2001-000816	R-CARBON;5.6OHM,5%,1/4W,AA,TP,-	1
R11	2001-000864	R-CARBON;56KOHM,5%,1/8W,AA,TP,-	1
R202	2001-001070	R-CARBON(S);120OHM,5%,1/2W,AA,TP,-	1
R201,R205	2001-001150	R-CARBON(S);470KOHM,5%,1/2W,AA,TP,-	2
R301	2003-000468	R-METAL OXIDE(S);10ohm,5%,1W,AA,TP,3.3x9mm	1
R300	2003-000659	R-METAL OXIDE(S);33ohm,5%,1W,AA,TP,3.3x9mm	1
R253	2004-000109	R-METAL;1.07Kohm,1%,1/4W,AA,TP,2.4x6.4	1
R261	2004-000135	R-METAL;1.3Kohm,1%,1/4W,AA,TP,2.4x6.4m	1
R2,R37,R38,R39,R40	2004-000345	R-METAL;15Kohm,1%,1/8W,AA,TP,1.8x3.2mm	5
R254	2004-000432	R-METAL;1Kohm,1%,1/4W,AA,TP,2.4x6.4mm	1
R8	2004-000433	R-METAL;1Kohm,1%,1/8W,AA,TP,1.8x3.2mm	1
R260	2004-000601	R-METAL;24.9Kohm,1%,1/4W,AA,TP,2.4x6.4	1
R12	2004-000699	R-METAL;3.3Kohm,1%,1/8W,AA,TP,1.8x3.2m	1
C300	2201-000004	C-CERAMIC,DISC;100pF,10%,2KV,SL,TP,8x5,5	1
C2,C4,C6,C10,C11	2201-000017	C-CERAMIC,DISC;1nF,10%,50V,Y5P,TP,4x3.5,5	5
C25,C26,C29,C30,C31	2201-000017	C-CERAMIC,DISC;1nF,10%,50V,Y5P,TP,4x3.5,5	5
C32,C39	2201-000017	C-CERAMIC,DISC;1nF,10%,50V,Y5P,TP,4x3.5,5	2
C206	2201-000019	C-CERAMIC,DISC;10nF,+80-20%,500V,Y5V,TP,13.5x	1
C1,C16,C18,C33	2201-000119	C-CERAMIC,DISC;100nF,+80-20%,50V,Y5V,TP,8x3.5	4
C36,C37,C267	2201-000119	C-CERAMIC,DISC;100nF,+80-20%,50V,Y5V,TP,8x3.5	3
C5,C22,C23,C27	2201-000138	C-CERAMIC,DISC;100pF,10%,50V,Y5P,TP,4.0X4.0,2	4
C3,C13,C35	2201-000162	C-CERAMIC,DISC;10NF,+80-20%,50V,Y5V,TP,6.3X3,5	3
C15,C17	2201-000391	C-CERAMIC,DISC;22pF,5%,50V,SL,TP,5.0x3.0,5	2
C301	2201-000724	C-CERAMIC,DISC;470pF,0.1,3KV,Y5P,TP,8x5,5	1
C19	2202-000002	C-CERAMIC,MLC-AXIAL;10nF,0.05,500V,X7R,TP,5.1x6.4x	1
C21,C24,C38	2202-000630	C-CERAMIC,MLC-AXIAL;100nF,10%,50V,X7R,TP,3.8x7.4mm	3
C8,C12,C14,C20	2202-000630	C-CERAMIC,MLC-AXIAL;100nF,10%,50V,X7R,TP,3.8x7.4mm	4
C213,C228,C265	2202-000888	C-CERAMIC,MLC-RADIAL;100nF,20%,50V,Z5U,TP,5.1x3.2x5	3
C266	2301-000010	C-FILM,PEF;100nF,5%,100V,TP,11.5x12.5mm,5	1
C252	2401-001082	C-AL;330nF,20%,50V,GP,TP,5x11,5	1
C34	2401-001476	C-AL;47uF,20%,10V,GP,TP,6.3x5mm,2.5	1
C259	2401-001700	C-AL;470uF,20%,10V,-,-,10x12.5,-	1
C7,C9	2401-002075	C-AL;4.7uF,20%,50V,GP,TP,5x11,5	2
C209,C257	2401-002300	C-AL;47uF,20%,50V,GP,TP,6.3x11,5	2
BD201	2902-001011	FILTER-LINE;-,-,-	1
FB1,FB2,FB3,FB4,FB5	3301-000344	CORE-FERRITE BEAD;ZZ,3.5x6.5mm,-,-	5
FH1,FH2	3602-000001	FUSE-CLIP;-,-,30mohm	2
JP1,JP2,JP3,JP4,JP5,JP6,JP7,JP8, JP9,JP10	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	10
JP101,JP102,JP103,JP104,JP105,JP106	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP107,JP108,JP110,JP111,JP112,JP113	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP11,JP12,JP13,JP14,JP15,JP16, JP17,JP18	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP114,JP115,JP116,JP117,JP118,JP119	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP120,JP121,JP122,JP123,JP124	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	5
JP126,JP127,JP128,JP130,JP131,JP132	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP133,JP134,JP135,JP136,JP137,JP138	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP139,JP140,JP141,JP142,JP143,JP144	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP145,JP146,JP147,JP148,JP149	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	5
JP151,JP156,JP157,JP158,JP159,JP160	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP169,JP170,JP173	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP175,JP176,JP191,JP192	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	4
JP19,JP20,JP21,JP22,JP23,JP24, JP25,JP26	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP198,JP200,JP229,JP230	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	4
JP27,JP28,JP29,JP30,JP31,JP32, JP33,JP34	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP35,JP36,JP37,JP38,JP39,JP40, JP41,JP42	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP43,JP44,JP45,JP46,JP47,JP49, JP50,JP51	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8

Engine Board (220V)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
JP52,JP53,JP54,JP55,JP56,JP57, JP58,JP59	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP61,JP62,JP63,JP64,JP66,JP67, JP68,JP69	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP72,JP73,JP75,JP76,JP77,JP78, JP79,JP80	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP81,JP82,JP83,JP84	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	4
JP86,JP87,JP88,JP89,JP90,JP91, JP92,JP93	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP94,JP95,JP96,JP97,JP98,JP99,JP100	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	7
ENGINE PCB	JC41-10533A	PCB-ENGINE B'D(MAIN);ML-5000A,FR,1L,T1.6mm,280X137m	1
HEAT SINK ASS'Y(D252,D253,Q251,U9)	JC96-01217A	ELA HOU-H'SINK_220V;ML-5000,LEX/XRX,USA,220V,*,*,*	1
D253	0402-000304	DIODE-RECTIFIER;STPR1020CF,200V,5A,TO-220,ST	1
D252	0402-000314	DIODE-RECTIFIER;D10SC4M,40V,10A,ITO-220	1
Q251	1203-001491	IC-VOLTAGE REGULATOR;30RV31,T0-220,4P,-,PLASTIC,1.5	1
U9	1203-001507	IC-PWM CONTROLLER;226,TO-220,3P,-,PLASTIC,-0.3/9	1
Q201	1401-000108	THYRISTOR-TRIAC;100A,600V,-,5V/uS,TO-220AB	1
SCREW	6003-000008	SCREW-TAPTITE;BH,+,S,M3,L4,ZPC3,SWRCH18A	1
-	6003-000119	SCREW-TAPTITE;BH,+,B,M3,L8,CBLACK,SWRCH18A	4
HS106	JC62-30907A	HEAT SINK-ENGINE;ML-5000A,AL,BLACK ANODIZING	1
HS107,HS108,HS202	JC62-30908A	HEAT SINK-SMPS;ML-5000,AL,ANODIZING	3
HEAT SINK(Q201)	JF62-30201A	HEAT SINK;HVPS,SPCC,t1.0	1

6-3 Engine Board (110V)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
-	JC92-00999A	PBA MAIN-ENGINE;ML-5000A,STA,USA,110V,*,137.3X	-
DB201	0402-000104	DIODE-BRIDGE;D3SBA60,600V,4A,-,ST	1
PC252	0604-000001	PHOTO-COUPLER;TR,50-60%,200mW,DIP-4,ST	1
PC1	0604-000146	PHOTO-COUPLER;TRIAC,-,250mW,DIP-6,ST	1
OP3	0604-001033	PHOTO-INTERRUPTER;TR,-,150mW,DIP-4,ST	1
U4	0801-000528	IC-CMOS LOGIC;74HCT574,D FLIP-FLOP,DIP,20P,3	1
U6	0801-000722	IC-CMOS LOGIC;74HC245,TRANSCEIVER,DIP,20P,30	1
U7	0803-001039	IC-TTL;74LS14,SCHIMITT INVERTER,DIP,1	1
U2	0803-001097	IC-TTL;7407,BUFFER/DRIVER,DIP,14P,300	1
U5	0903-000219	IC-MICROCOMPUTER;88C4316,8BIT,DIP,64P,-,8MHz,ST	1
U3	1102-000239	IC-EPROM;27C256,32Kx8BIT,DIP,28P,600MIL	1
U8	1103-000178	IC-EEPROM;9346,1Kx1BIT,DIP,8P,300MIL,400	1
U1	1202-000103	IC-VOLTAGE COMP.;393,DIP,8P,300MIL,DUAL,36V,CMO	1
TH201	1404-000167	THERMISTOR-NTC;5ohm,10%,3150K,18.7mW/C,TP	1
TNR202	1405-000111	VARISTOR;1800V,4500A,17.5x15mm,TP	1
TNR201	1405-000147	VARISTOR;470V,4500A,17x12mm,BK	1
TNR203	1405-000147	VARISTOR;470V,4500A,17x12mm,BK	1
R256	2003-000190	R-METAL OXIDE;1Kohm,2%,2W,AA,TP,6x16mm	1
R252	2003-000333	R-METAL OXIDE;56ohm,5%,2W,AA,TP,6x16mm	1
R208	2006-001052	R-CEMENT;10Kohm,5%,3W,CJ,TP,12.5x9x21mm	1
C203	2201-002071	C-CERAMIC,DISC;2.2nF,20%,400VAC,Y5U,TP,13x7,1	1
C204	2201-002071	C-CERAMIC,DISC;2.2nF,20%,400VAC,Y5U,TP,13x7,1	1
C215	2201-002071	C-CERAMIC,DISC;2.2nF,20%,400VAC,Y5U,TP,13x7,1	1
C208	2301-000276	C-FILM,PEF;47nF,10%,400V,TP,16.5x10.5x7.5	1
C201	2301-000323	C-FILM,PEF;220nF,0.1,250V,-,-,-	1
C202	2305-000002	C-FILM,MPEF;47nF,20%,250VAC,BK,18X12.5X5.5	1
C256	2401-000183	C-AL;1000uF,20%,35V,WT,TP,12.5x25,5	1
C258	2401-000183	C-AL;1000uF,20%,35V,WT,TP,12.5x25,5	1
C251	2401-000697	C-AL;2200uF,20%,16V,WT,TP,12.5x25,5	1
C207	2401-001695	C-AL;220uF,20%,200V,WT,BK,22x25,10	1
X1	2801-000002	CRYSTAL-UNIT;6.94407MHz,50ppm,28-AAM,20pF,5	1
F201	3601-000157	FUSE-FERRULE;125V,8A,SLOW BLOW,GLASS,5x20mm	1
U3(SOCKET)	3704-000235	SOCKET-IC;28P,DIP,SN,2.54mm	1
CN201	3711-000217	CONNECTOR-HEADER;1WALL,3P,1R,3.96mm	1
CN1	3711-000814	CONNECTOR-HEADER;BOX,2P,1R,2.5mm,ANGLE,SN	1
CN4	3711-002001	CONNECTOR-HEADER;-,20P,2R,2mm,STRAIGHT,SN	1
CN202	3711-002104	CONNECTOR-HEADER;1WALL,2P,1R,7.92mm,STRAIGHT,SN	1
CN2	3711-003204	CONNECTOR-HEADER;BOX,24P,2R,2mm	1
CN5	3711-003204	CONNECTOR-HEADER;BOX,24P,2R,2mm	1
CN3	3711-003205	CONNECTOR-HEADER;BOX,4P,1R,2.0mm	1
-	GG68-30817A	LABEL(R)-BAR CODE;SP-R401,PS,-,T4.6,BLK	1
T201	JC26-30504A	TRANS POWER-S/W;ML-5000A,110V,500uH	1
L201	JC27-60100A	COIL FILTER-;-,-,110mohm,-	1
L203	JC27-60101A	COIL FILTER-;-,300UH,-,-	1
L251	JC27-60101B	COIL FILTER-;-,9UH,-,-	1
L202	JC27-60101D	COIL FILTER-;-,-,-,-	1
D1,D2,D3,D4,D5,D203	0401-000005	DIODE-SWITCHING;1N4148,75V,300mA,DO-35,TP	6
D202	0402-000012	DIODE-RECTIFIER;UF4007,1KV,1A,DO-41,TP	1
D206	0406-001055	DIODE-TVS;P6KE100A,95/100/105V,600W,DO-2	1
Q1,Q2,Q3	0501-000010	TR-SMALL SIGNAL;KSC1008,NPN,800mW,TO-92,TP,120	3
U251	1203-000002	IC-POSI.ADJUST REG.;431,TO-92,3P,-,PLASTIC,2.44/2.	1
R13,R28,R32	2001-000003	R-CARBON;330OHM,5%,1/8W,AA,TP,-	3
R25,R251	2001-000027	R-CARBON;100OHM,5%,1/4W,AA,TP,-	2
R16	2001-000105	R-CARBON;1.5KOHM,5%,1/4W,AA,TP,-	1
R203	2001-000118	R-CARBON(S);180OHM,5%,1/2W,AA,TP,-	1
R29	2001-000221	R-CARBON;1.2KOHM,5%,1/8W,AA,TP,-	1
R17,R24,R41,R42	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,-	4
R44,R45	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,-	2
R1,R47	2001-000331	R-CARBON;12KOHM,5%,1/8W,AA,TP,-	2
R36	2001-000362	R-CARBON;150OHM,5%,1/8W,AA,TP,-	1
R3,R22,R23,R43	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,-	4
R46	2001-000515	R-CARBON;220OHM,5%,1/8W,AA,TP,-	1
R7	2001-000660	R-CARBON;33KOHM,5%,1/8W,AA,TP,-	1
R10	2001-000723	R-CARBON;4.3KOHM,5%,1/8W,AA,TP,-	1
R5,R14	2001-000734	R-CARBON;4.7KOHM,5%,1/8W,AA,TP,-	2

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LOCATION	SEC CODE	DESCRIPTION	Q'TY
R9	2001-000786	R-CARBON;47KOHM,5%,1/8W,AA,TP,-	1
R20,R21,R26,R27,R30	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	5
R31,R33,R34,R35,R50	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	5
R4,R6,R15,R18,R19	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	5
R210	2001-000816	R-CARBON;5.6OHM,5%,1/4W,AA,TP,-	1
R11	2001-000864	R-CARBON;56KOHM,5%,1/8W,AA,TP,-	1
R202	2001-001070	R-CARBON(S);120OHM,5%,1/2W,AA,TP,-	1
R201,R205	2001-001150	R-CARBON(S);470KOHM,5%,1/2W,AA,TP,-	2
R301	2003-000468	R-METAL OXIDE(S);10ohm,5%,1W,AA,TP,3.3x9mm	1
R300	2003-000659	R-METAL OXIDE(S);33ohm,5%,1W,AA,TP,3.3x9mm	1
R253	2004-000109	R-METAL;1.07Kohm,1%,1/4W,AA,TP,2.4x6.4	1
R261	2004-000135	R-METAL;1.3Kohm,1%,1/4W,AA,TP,2.4x6.4m	1
R2,R37,R38,R39,R40	2004-000345	R-METAL;15Kohm,1%,1/8W,AA,TP,1.8x3.2mm	5
R254	2004-000432	R-METAL;1Kohm,1%,1/4W,AA,TP,2.4x6.4mm	1
R8	2004-000433	R-METAL;1Kohm,1%,1/8W,AA,TP,1.8x3.2mm	1
R260	2004-000601	R-METAL;24.9Kohm,1%,1/4W,AA,TP,2.4x6.4	1
R12	2004-000699	R-METAL;3.3Kohm,1%,1/8W,AA,TP,1.8x3.2m	1
C300	2201-000004	C-CERAMIC,DISC;100pF,10%,2KV,SL,TP,8x5,5	1
C2,C4,C6,C10,C11	2201-000017	C-CERAMIC,DISC;1nF,10%,50V,Y5P,TP,4x3.5,5	5
C25,C26,C29,C30,C31	2201-000017	C-CERAMIC,DISC;1nF,10%,50V,Y5P,TP,4x3.5,5	5
C32,C39	2201-000017	C-CERAMIC,DISC;1nF,10%,50V,Y5P,TP,4x3.5,5	2
C206	2201-000019	C-CERAMIC,DISC;10nF,+80-20%,500V,Y5V,TP,13.5x	1
C1,C16,C18,C33	2201-000119	C-CERAMIC,DISC;100nF,+80-20%,50V,Y5V,TP,8x3.5	4
C36,C37,C267	2201-000119	C-CERAMIC,DISC;100nF,+80-20%,50V,Y5V,TP,8x3.5	3
C5,C22,C23,C27	2201-000138	C-CERAMIC,DISC;100pF,10%,50V,Y5P,TP,4.0X4.0,2	4
C3,C13,C35	2201-000162	C-CERAMIC,DISC;10NF,+80-20%,50V,Y5V,TP,6.3X3,5	3
C15,C17	2201-000391	C-CERAMIC,DISC;22pF,5%,50V,SL,TP,5.0x3.0,5	2
C301	2201-000724	C-CERAMIC,DISC;470pF,0.1,3KV,Y5P,TP,8x5,5	1
C19	2202-000002	C-CERAMIC,MLC-AXIAL;10nF,0.05,500V,X7R,TP,5.1x6.4x	1
C21,C24,C38	2202-000630	C-CERAMIC,MLC-AXIAL;100nF,10%,50V,X7R,TP,3.8x7.4mm	3
C8,C12,C14,C20	2202-000630	C-CERAMIC,MLC-AXIAL;100nF,10%,50V,X7R,TP,3.8x7.4mm	4
C228,C213,C265	2202-000888	C-CERAMIC,MLC-RADIAL;100nF,20%,50V,Z5U,TP,5.1x3.2x5	3
C266	2301-000010	C-FILM,PEF;100nF,5%,100V,TP,11.5x12.5mm,5	1
C252	2401-001082	C-AL;330nF,20%,50V,GP,TP,5x11,5	1
C34	2401-001476	C-AL;47uF,20%,10V,GP,TP,6.3x5mm,2.5	1
C259	2401-001700	C-AL;470uF,20%,10V,-,-,10x12.5,-	1
C7,C9	2401-002075	C-AL;4.7uF,20%,50V,GP,TP,5x11,5	2
C209,C257	2401-002300	C-AL;47uF,20%,50V,GP,TP,6.3x11,5	2
BD201	2902-001011	FILTER-LINE;-,-,-	1
FB1,FB2,FB3,FB4,FB5	3301-000344	CORE-FERRITE BEAD;ZZ,3.5x6.5mm,-,-	5
FH1,FH2	3602-000001	FUSE-CLIP;-,-,30mohm	2
JP1,JP2,JP3,JP4,JP5,JP6,JP7,JP8, JP9,JP10	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	10
JP100,JP101,JP102,JP103,JP104,JP105	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP106,JP107,JP108	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP11,JP12,JP13,JP14,JP15,JP16, JP17,JP18	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP110,JP111,JP112,JP113,JP114,JP115	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP116,JP117,JP118,JP119,JP120,JP121	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP122,JP123,JP124	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP126,JP127,JP128	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP130,JP131,JP132,JP133,JP134,JP135	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP136,JP137,JP138,JP139,JP140,JP141	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP142,JP143,JP144,JP145,JP146,JP147	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP148,JP149	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	2
JP151,JP156,JP157,JP158,JP159,JP160	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP169,JP170,JP173	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP175,JP176,JP191	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP19,JP20,JP21,JP22,JP23,JP24, JP25,JP26	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP192,JP198	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	2
JP200,JP229,JP230	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP27,JP28,JP29,JP30,JP31,JP32, JP33,JP34	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8

Engine Board (110V)

LOCATION	SEC CODE	DESCRIPTION	Q'TY
JP35,JP36,JP37,JP38,JP39,JP40, JP41,JP42	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP43,JP44,JP45,JP46,JP47,JP48, JP49,JP50	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP51,JP52,JP53,JP54,JP55,JP56, JP57,JP58	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP59,JP61,JP62,JP63,JP64	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	5
JP66,JP67,JP68,JP69,JP72,JP73	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP75,JP76,JP77,JP78,JP79,JP80, JP81,JP82	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP83,JP84,JP86,JP87,JP88,JP89, JP90,JP91	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
JP92,JP93,JP94,JP95,JP96,JP97, JP98,JP99	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	8
ENGINE PCB	JC41-10533A	PCB-ENGINE B'D(MAIN);ML-5000A,FR,1L,T1.6mm,280X137m	1
HEAT SINK ASS'Y(D252,D253,Q251,U9)	JC96-01216A	ELA HOU-H'SINK_110V;ML-5000,LEX/XRX,USA,110V,*,*,*	1
D253	0402-000304	DIODE-RECTIFIER;STPR1020CF,200V,5A,TO-220,ST	1
D252	0402-000314	DIODE-RECTIFIER;D10SC4M,40V,10A,ITO-220	1
Q251	1203-001491	IC-VOLTAGE REGULATOR;30RV31,T0-220,4P,-,PLASTIC,1.5	1
U9	1203-001504	IC-PWM CONTROLLER;104,TO-220,3P,-,PLASTIC,-,-,-4	1
Q201	1401-000108	THYRISTOR-TRIAC;100A,600V,-,5V/uS,TO-220AB	1
SCREW	6003-000008	SCREW-TAPTITE;BH,+,S,M3,L4,ZPC3,SWRCH18A	1
-	6003-000119	SCREW-TAPTITE;BH,+,B,M3,L8,CBLACK,SWRCH18A	4
HS106	JC62-30907A	HEAT SINK-ENGINE;ML-5000A,AL,BLACK ANODIZING	1
HS107,HS108,HS202	JC62-30908A	HEAT SINK-SMPS;ML-5000,AL,ANODIZING	3
HEAT SINK(Q201)	JF62-30201A	HEAT SINK;HVPS,SPCC,t1.0	1

6-4 Joint Board

LOCATION	SEC CODE	DESCRIPTION	Q'TY
-	JC92-01001A	PBA SUB-JOINT;ML-5000A,STA,USA,*,*,80.6X137.	-
Q403	0502-000245	TR-POWER;KSB1151-Y,PNP,1.3W,TO-126,-,16	1
U401	1003-001165	IC-MOTOR DRIVER;SMA7029M,ANGLE,15P,31MIL,*,1.5	1
R416,R418	2003-000547	R-METAL OXIDE(S);1ohm,5%,3W,AA,TP,6x16mm	2
CN401	3711-000961	CONNECTOR-HEADER;BOX,4P,1R,2.5mm,STRAIGHT,SN	1
CN406	3711-002001	CONNECTOR-HEADER;-,20P,2R,2mm,STRAIGHT,SN	1
CN405	3711-002807	CONNECTOR-HEADER;BOX,6P,1R,2mm,STRAIGHT,SN	1
CN402,CN404,CN407	3711-003408	CONNECTOR-HEADER;BOX,2P,1R,2mm,STRAIGHT,SN	3
CN403,CN408	3711-003968	CONNECTOR-HEADER;BOX,3P,1R,2.5mm,STRAIGHT,SN	2
D402,D403,D404	0401-000005	DIODE-SWITCHING;1N4148,75V,300mA,DO-35,TP	3
D450	0401-000005	DIODE-SWITCHING;1N4148,75V,300mA,DO-35,TP	1
D401,D405	0402-000129	DIODE-RECTIFIER;1N4003,200V,1A,DO-41,TP	2
Q401,Q402,Q404,Q405	0501-000010	TR-SMALL SIGNAL;KSC1008,NPN,800mW,TO-92,TP,120	4
Q406,Q407,Q408,Q409	0501-000010	TR-SMALL SIGNAL;KSC1008,NPN,800mW,TO-92,TP,120	4
R408,R413	2001-000006	R-CARBON;2.4KOHM,5%,1/8W,AA,TP,-	2
R407	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,-	1
R450,R451,R452	2001-000281	R-CARBON;100OHM,5%,1/8W,AA,TP,-	3
R410	2001-000331	R-CARBON;12KOHM,5%,1/8W,AA,TP,-	1
R430	2001-000362	R-CARBON;150OHM,5%,1/8W,AA,TP,-	1
R403,R417,R420	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,-	3
R432	2001-000429	R-CARBON;1KOHM,5%,1/8W,AA,TP,-	1
R409	2001-000734	R-CARBON;4.7KOHM,5%,1/8W,AA,TP,-	1
R414,R421	2001-000786	R-CARBON;47KOHM,5%,1/8W,AA,TP,-	2
R401,R404,R412	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	3
R415,R419,R423,R431	2001-000812	R-CARBON;5.6KOHM,5%,1/8W,AA,TP,-	4
R402,R406	2001-000832	R-CARBON;510OHM,5%,1/8W,AA,TP,-	2
C408,C411	2201-000326	C-CERAMIC,DISC;2.2nF,10%,50V,Y5P,TP,6.5x3,5	2
C405,C406	2201-000469	C-CERAMIC,DISC;330pF,10%,500V,Y5P,TP,6x4,5	2
C409,C415	2201-000558	C-CERAMIC,DISC;470pF,10%,50V,Y5P,TP,5x3,5	2
C401,C403,C404,C410	2202-000002	C-CERAMIC,MLC-AXIAL;10nF,0.05,500V,X7R,TP,5.1x6.4x	4
C412	2202-000002	C-CERAMIC,MLC-AXIAL;10nF,0.05,500V,X7R,TP,5.1x6.4x	1
C402	2202-000630	C-CERAMIC,MLC-AXIAL;100nF,10%,50V,X7R,TP,3.8x7.4mm	1
C407,C413	2401-001476	C-AL;47uF,20%,10V,GP,TP,6.3x5mm,2.5	2
C416	2401-002300	C-AL;47uF,20%,50V,GP,TP,6.3x11,5	1
JP401,JP402,JP403,JP404,JP405,JP406	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP411,JP412,JP413,JP414,JP415,JP416	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP417,JP418,JP419,JP420,JP421,JP422	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	6
JP424,JP426,JP427,JP407,JP408	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	5
JP429,JP430	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	2
JP434,JP435,JP436	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP438,JP439,JP440,JP441,JP442	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	5
JP444,JP445,JP446	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	3
JP449,JP450	JC39-40511A	CBF HARNESS-;ML-80,JUMPER,AWG22,52mm,SILVER	2
JOINT PCB	JC41-10534A	PCB-ENG B'D(JOINT);ML-5000A,FR,1L,T1.6mm,223X140m	1

6-5 Panel Board

LOCATION	SEC CODE	DESCRIPTION	Q'TY
-	JC92-01059A	PBA SUB-PANEL_DOM;ML-5000,DOMESTIC,KOREA,*,*,74.	-
LED2	0601-001254	LED;ROUND,YEL,3mm,585nm	1
LED1	0601-001255	LED;ROUND,GRN,3mm,570nm	1
LED3	0601-001261	LED;ROUND,RED,3mm,630nm	1
R1	2001-000111	R-CARBON;150OHM,5%,1/4W,AA,TP,-	1
R2	2001-000111	R-CARBON;150OHM,5%,1/4W,AA,TP,-	1
R3	2001-000111	R-CARBON;150OHM,5%,1/4W,AA,TP,-	1
C1	2202-000579	C-CERAMIC,MLC-AXIAL;100nF,+80-20%,50V,Z5U,TP,2.5x4	1
SW1	3404-000116	SWITCH-TACT;12V,50mA,160gf,6X6X3.6mm,SPST	1
-	JC39-40567A	CBF HARNESS-7P;ML-5000A,FLAT,UL1061,420mm,WHT	1
PCB_PANEL	JC41-10552A	PCB-PANEL_DOM;ML-5000A/G,FR-1,1L,T1.6mm,153X	1

6-6 Paper Empty Board

LOCATION	SEC CODE	DESCRIPTION	Q'TY
-	JC92-01044A	PBA SUB OPTIC-PE;ML-5000A,XEROX,USA,*,*,*,*	-
OP3	0604-001033	PHOTO-INTERRUPTER;TR,-,150mW,DIP-4,ST	1
-	JC39-40561A	CBF HARNESS-3P;ML-5000A,FLAT,UL1061,170mm,BLK	1
-	JC41-10547A	PCB-P-EMPTY;ML-5000A,*,*,T1.6mm,100X100mm	1

6-7 Sensor Board

LOCATION	SEC CODE	DESCRIPTION	Q'TY
-	JC92-01017A	PBA SUB-SENSOR;ML-5000A,STA,USA,*,*,250X990mm	-
-	0604-000165	PHOTO-INTERRUPTER;TR,-,-,-,BK	2
R1,R3	2001-000362	R-CARBON;150OHM,5%,1/8W,AA,TP,-	2
-	JC39-40565A	CBF HARNESS-4P;ML-5000A,FLAT,UL1061,85mm,WHIT	1
-	JC41-10540A	PCB-SENSOR_B'D;ML-5000A,*,*,T1.6mm,990X250mm	1

Memo

7. Schematic Diagrams

7-1 Controller (ML-5000A) 1/7
Controller (ML-5000A) 2/7
Controller (ML-5000A) 3/7
Controller (ML-5000A) 4/7
Controller (ML-5000A) 5/7
Controller (ML-5000A) 6/7
Controller (ML-5000A) 7/7

7-2 Controller (ML-5000G) 1/2
Controller (ML-5000G) 2/2

7-3 OPE Panel (ML-5000A/G)

7-4 Engine (ML-5000A/G) 1/3
Engine (ML-5000A/G) 2/3
Engine (ML-5000A/G) 3/3

7-5 Joint Board (ML-5000A/G)

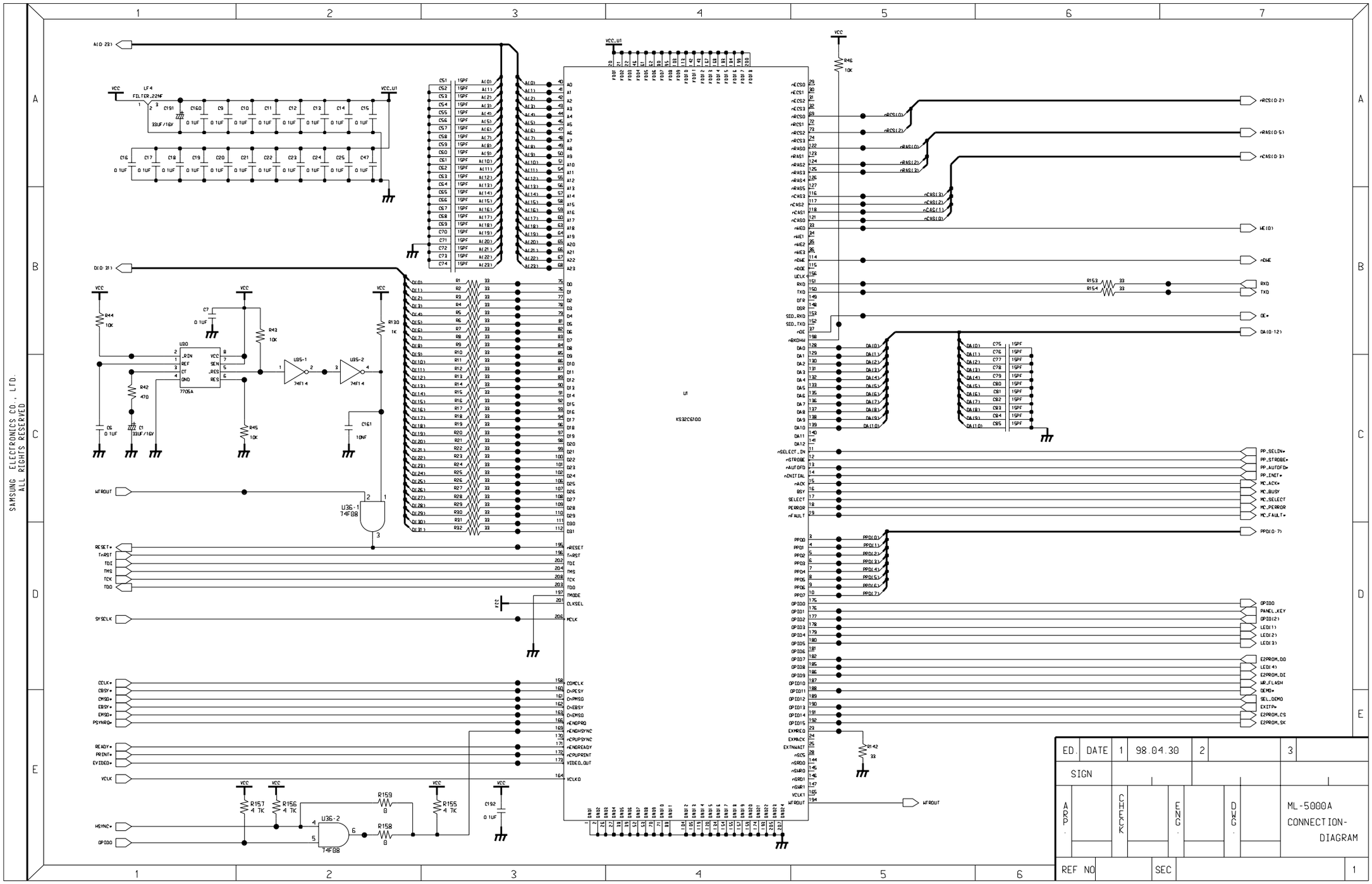
7-6 HVPS (ML-5000A/G) 1/3
HVPS (ML-5000A/G) 2/3
HVPS (ML-5000A/G) 3/3

7-7 Sensor (ML-5000A/G)

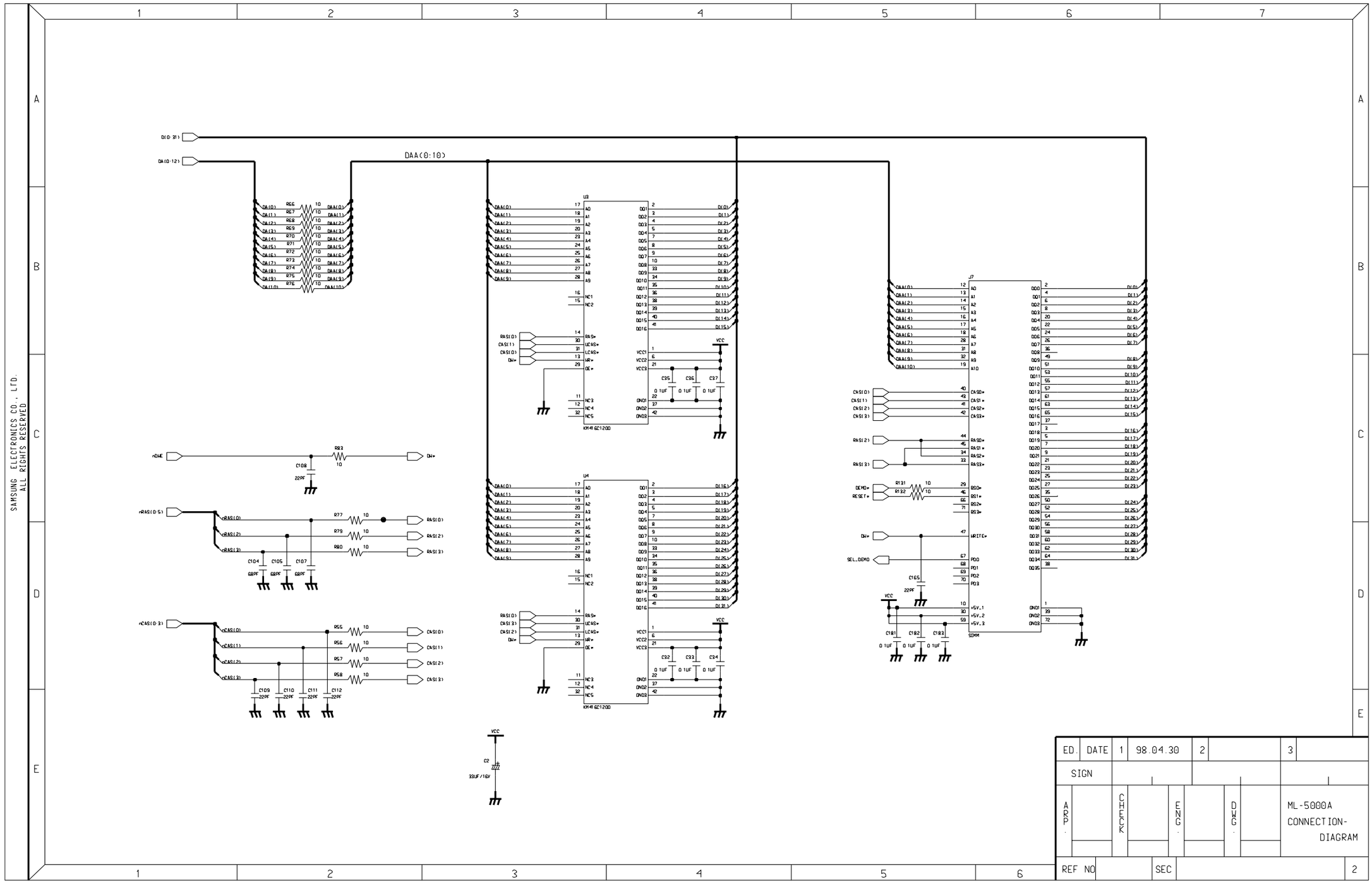
7-8 Switch (ML-5000A/G)

7-9 PTL (ML-5000A/G)

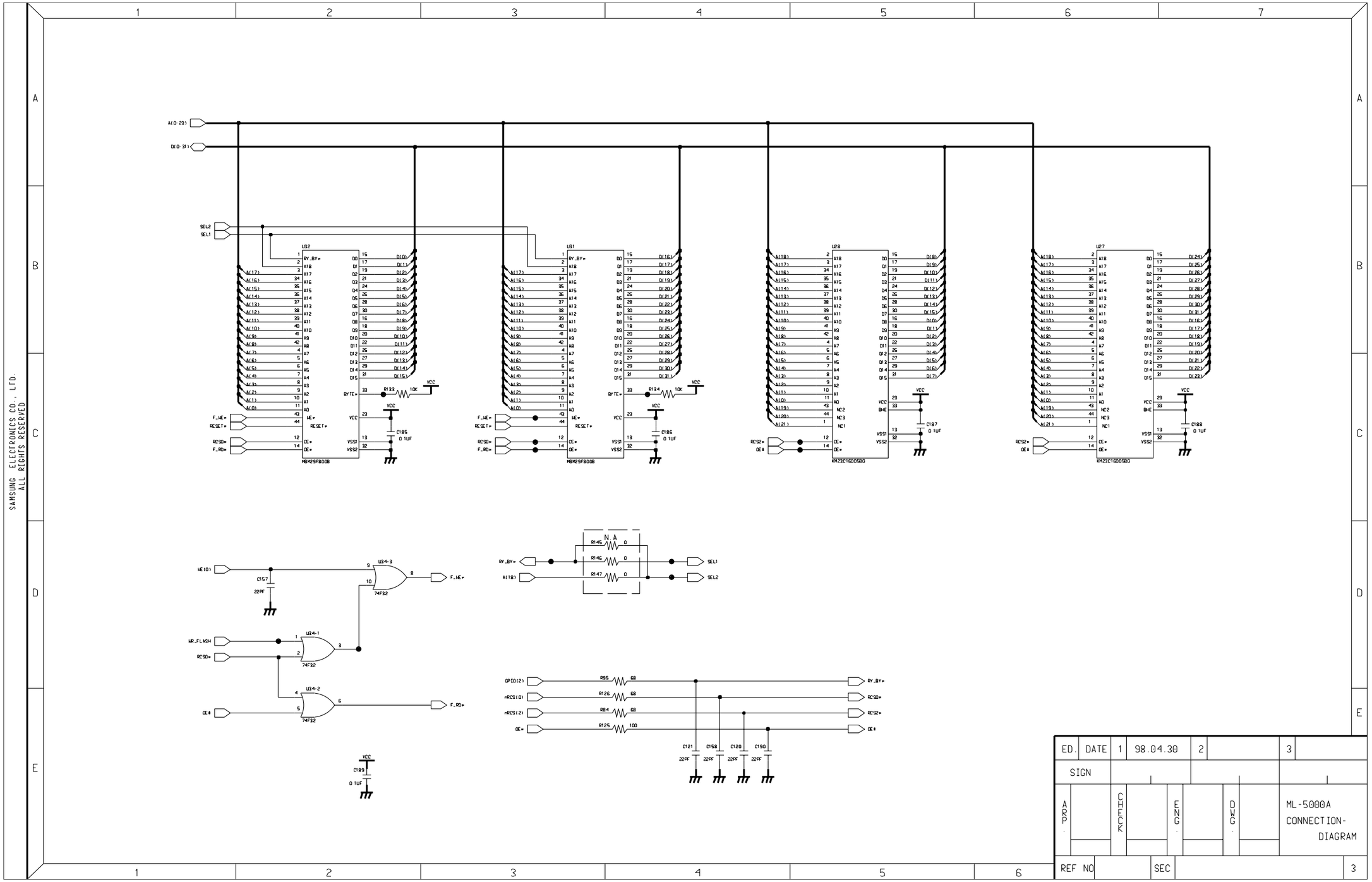
Controller (ML-5000A) 1/7



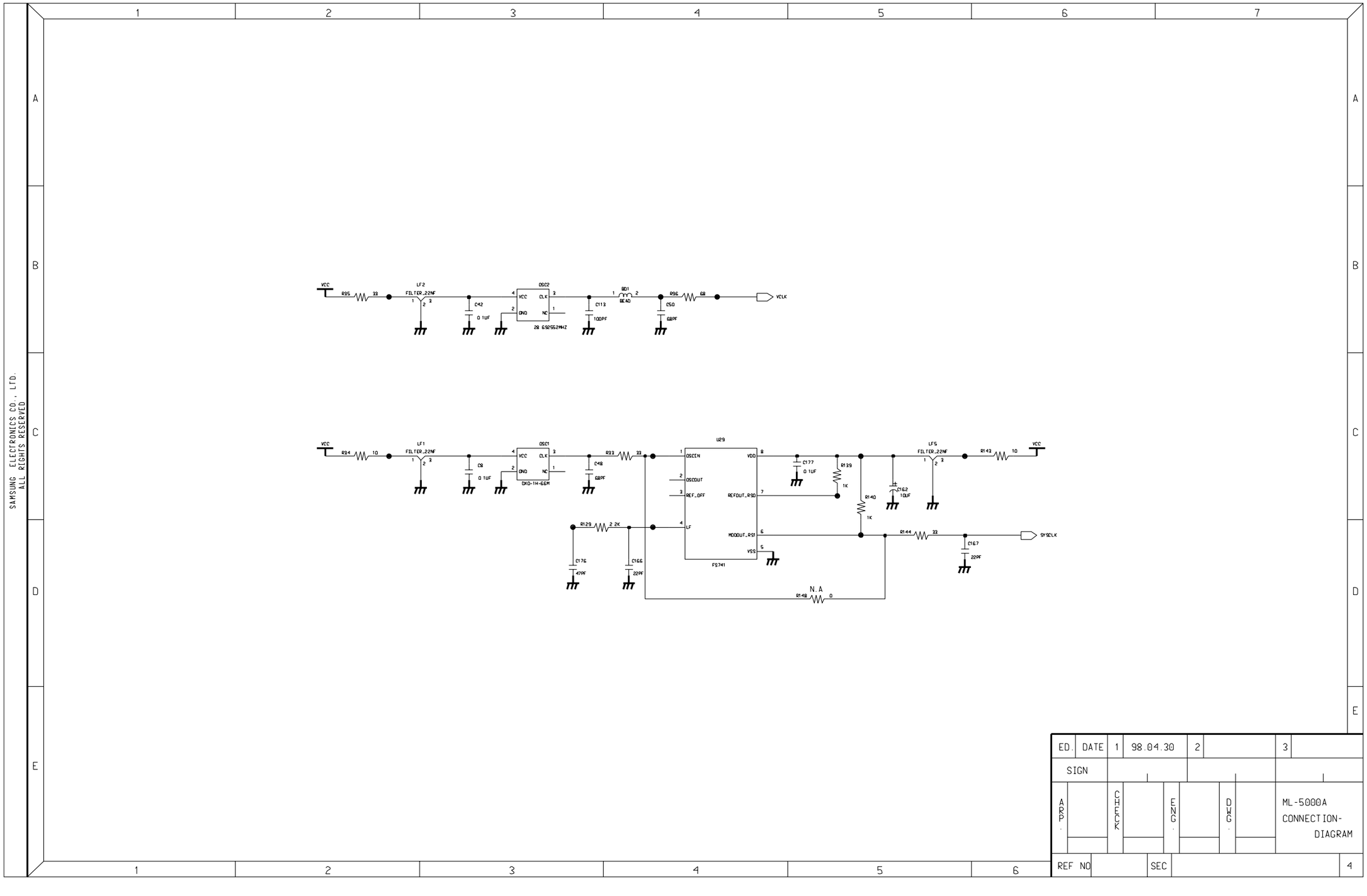
Controller (ML-5000A) 2/7



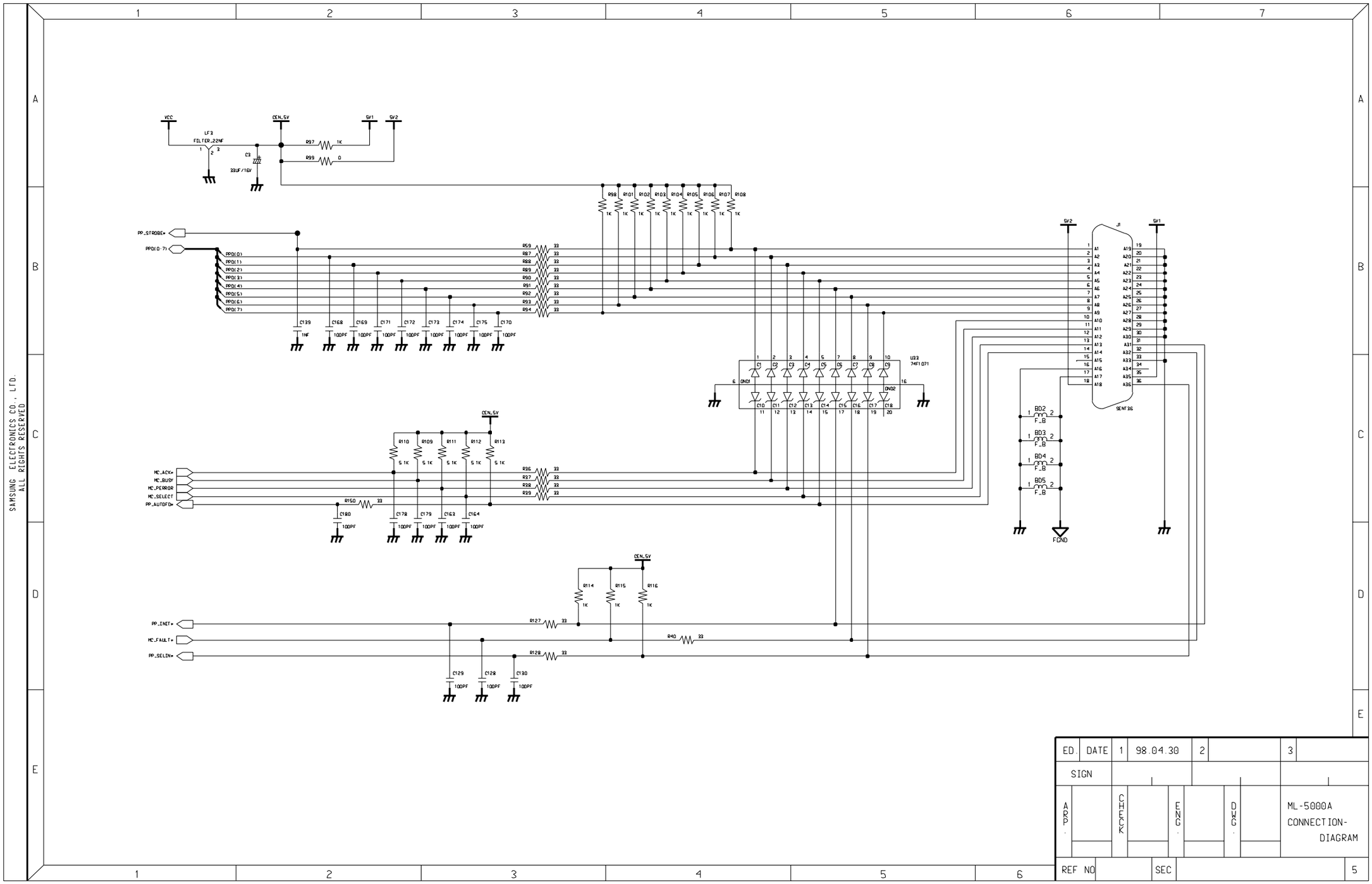
Controller (ML-5000A) 3/7



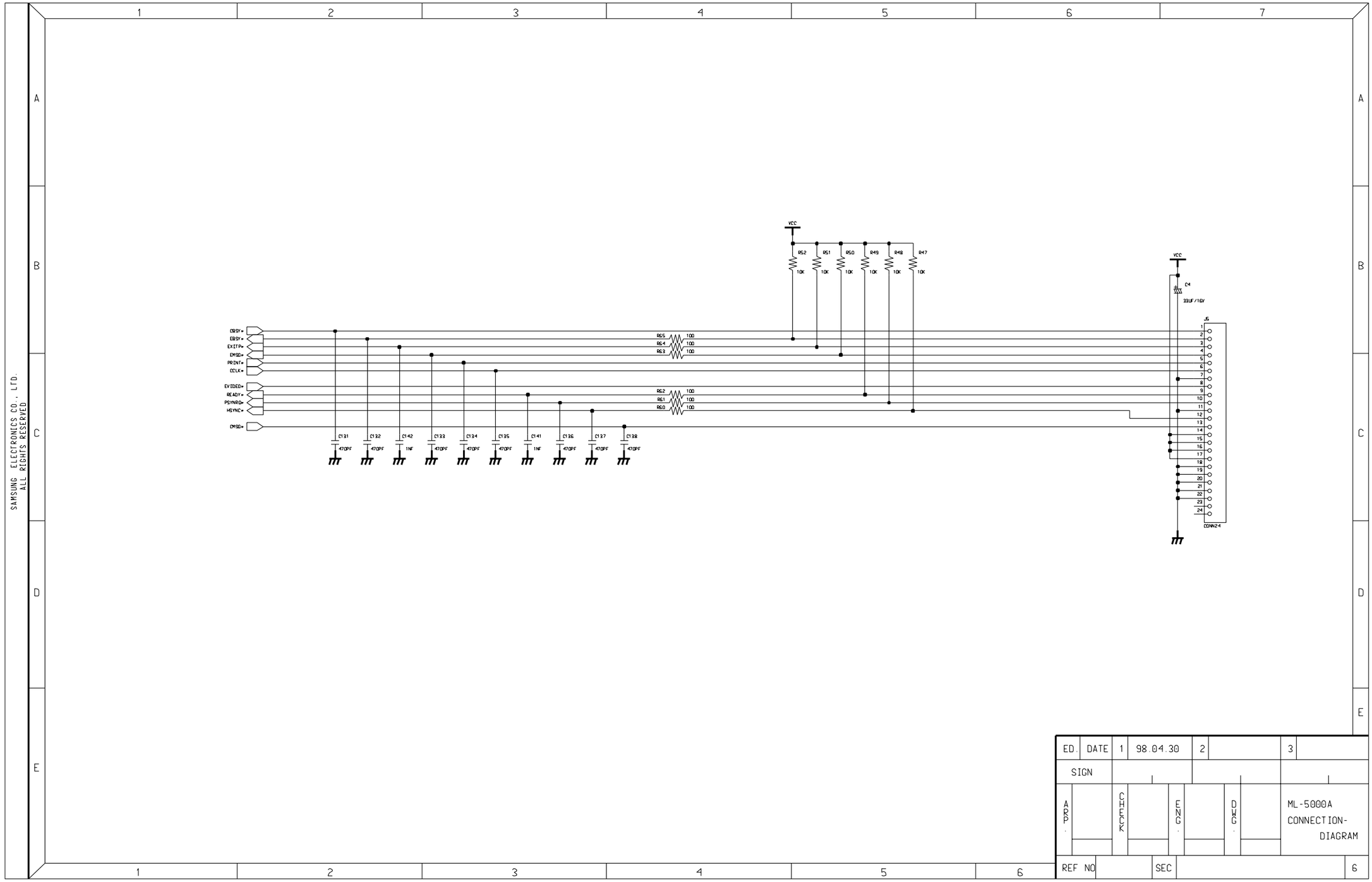
Controller (ML-5000A) 4/7



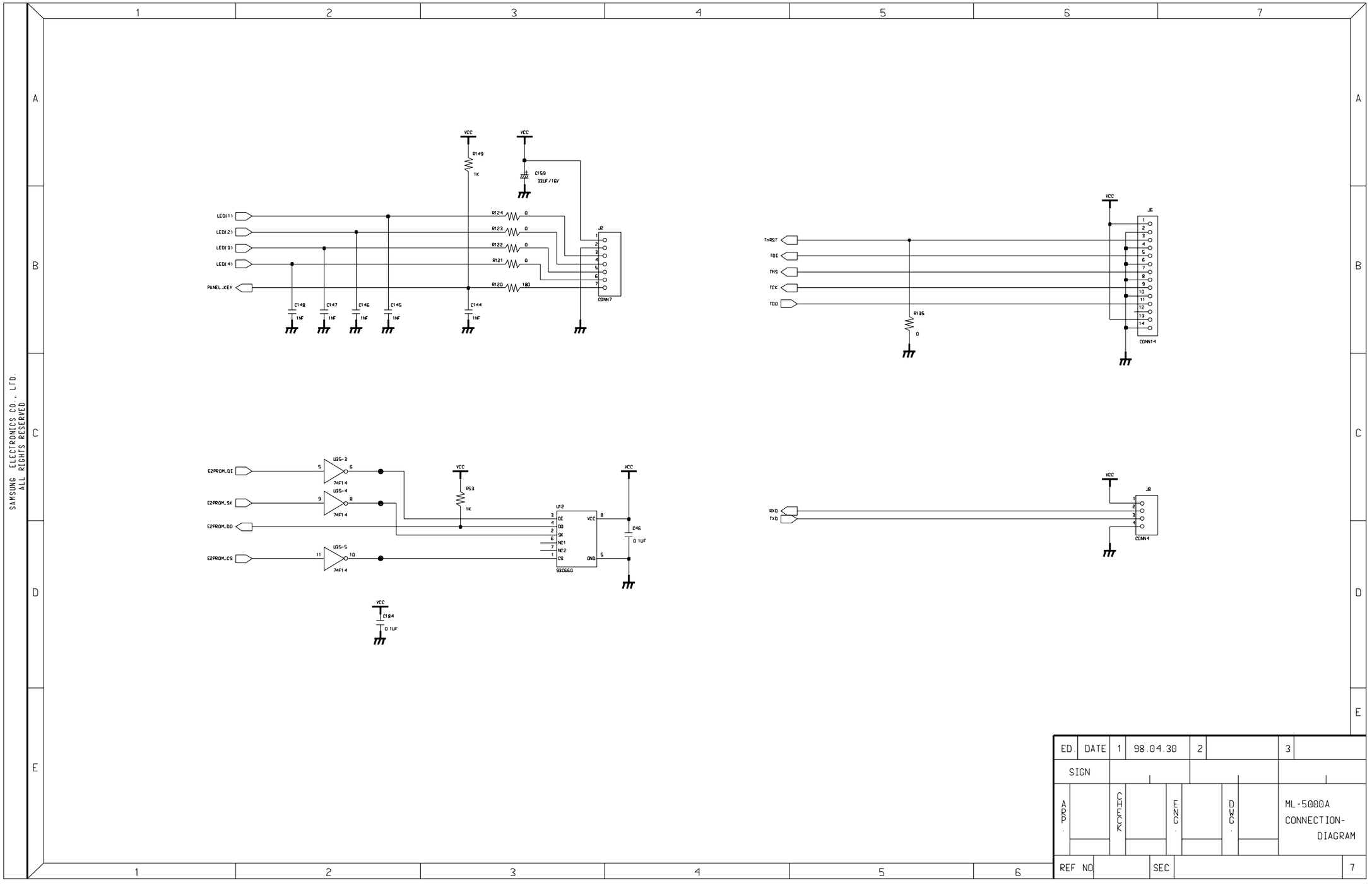
Controller (ML-5000A) 5/7



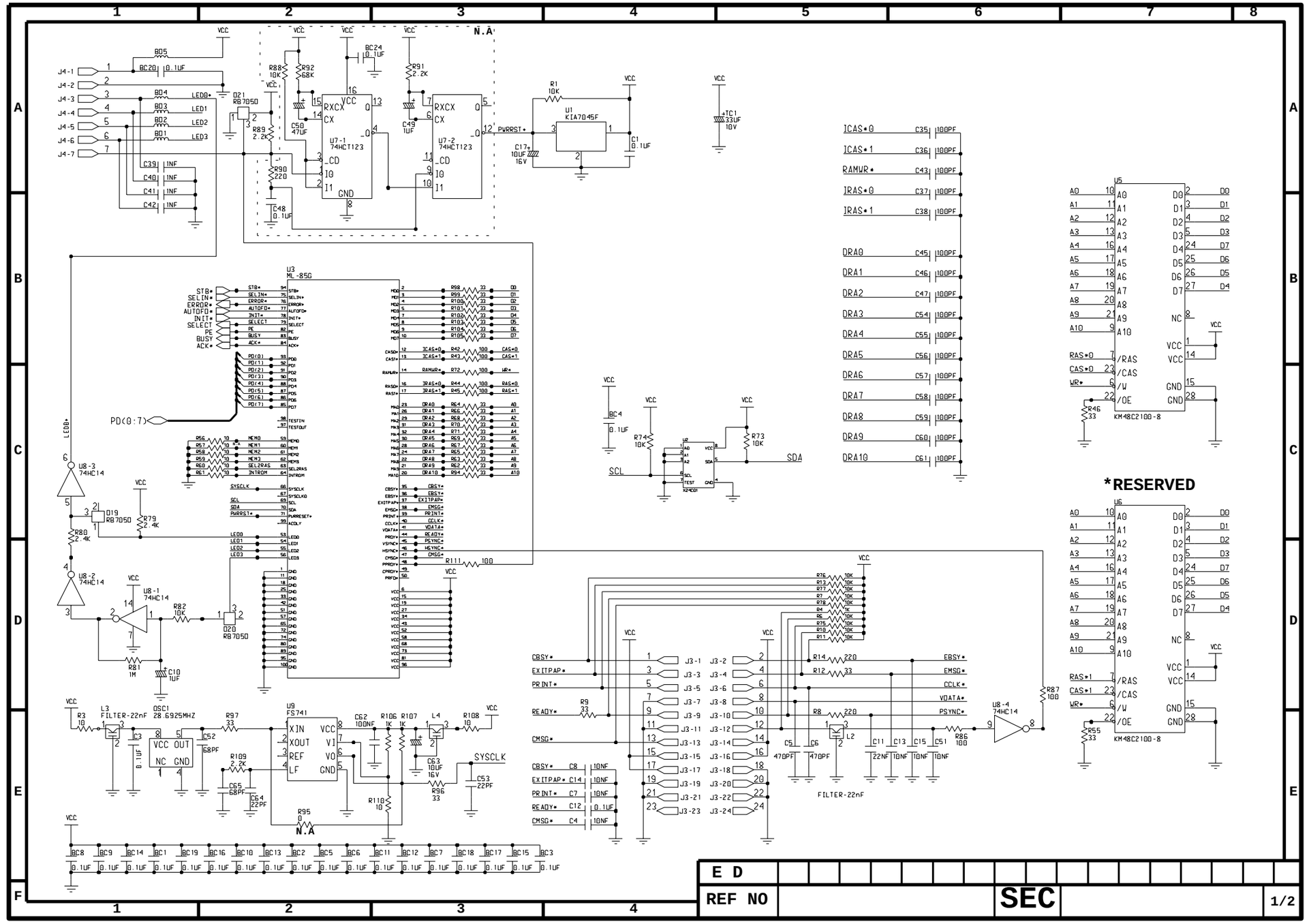
Controller (ML-5000A) 6/7



Controller (ML-5000A) 7/7



Controller (ML-5000G) 1/2



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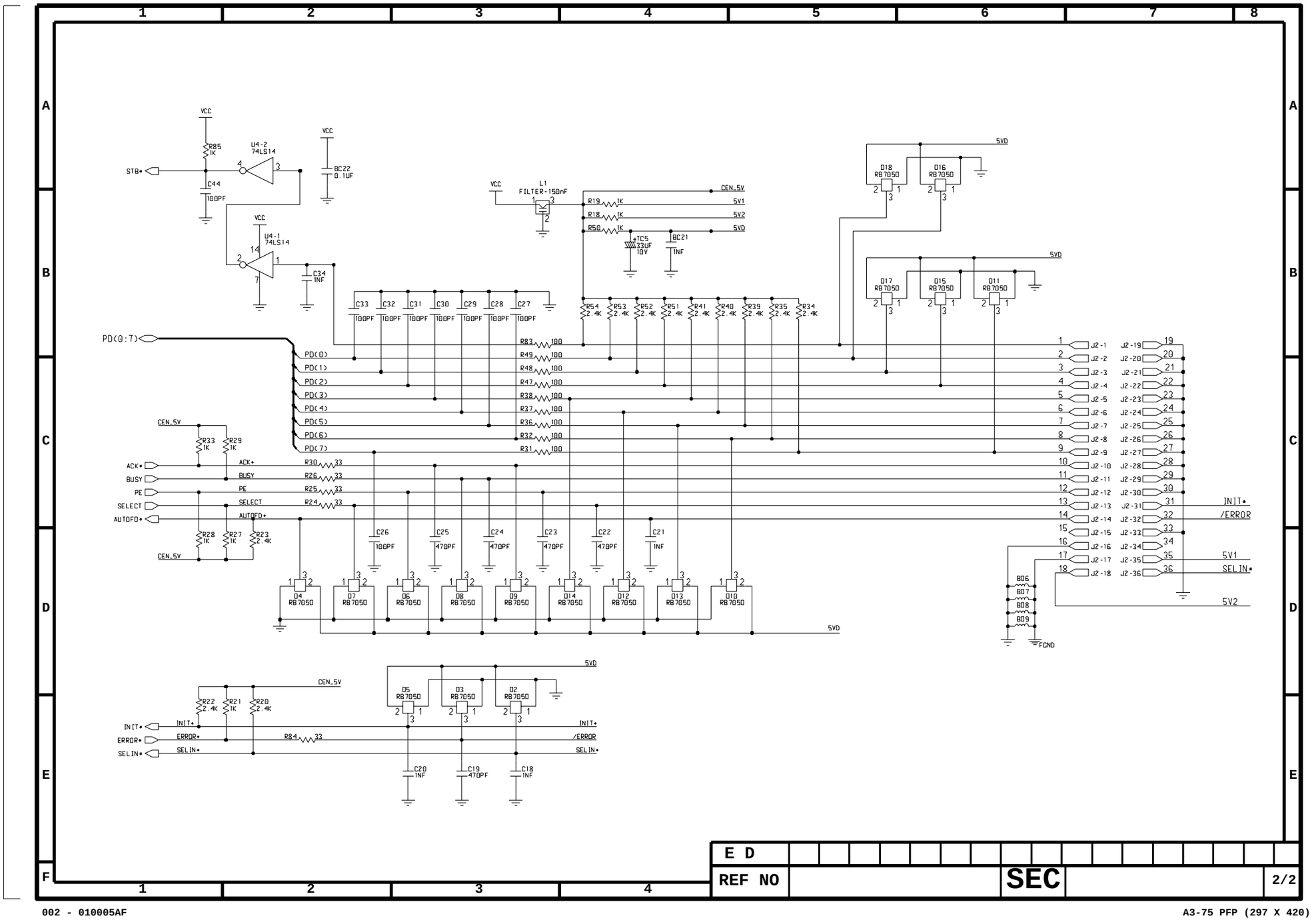
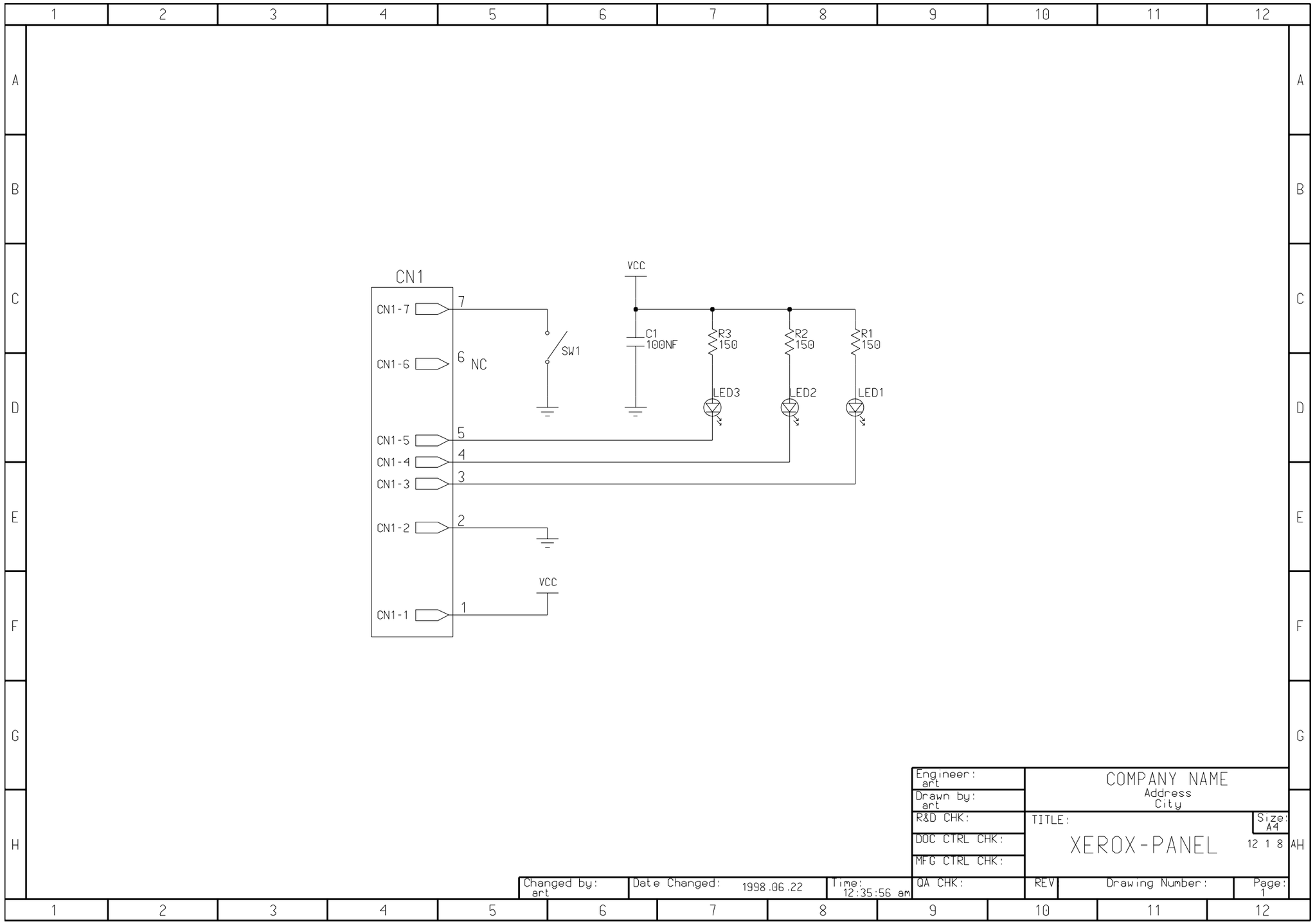
A3-75 PFP (297 X 420)

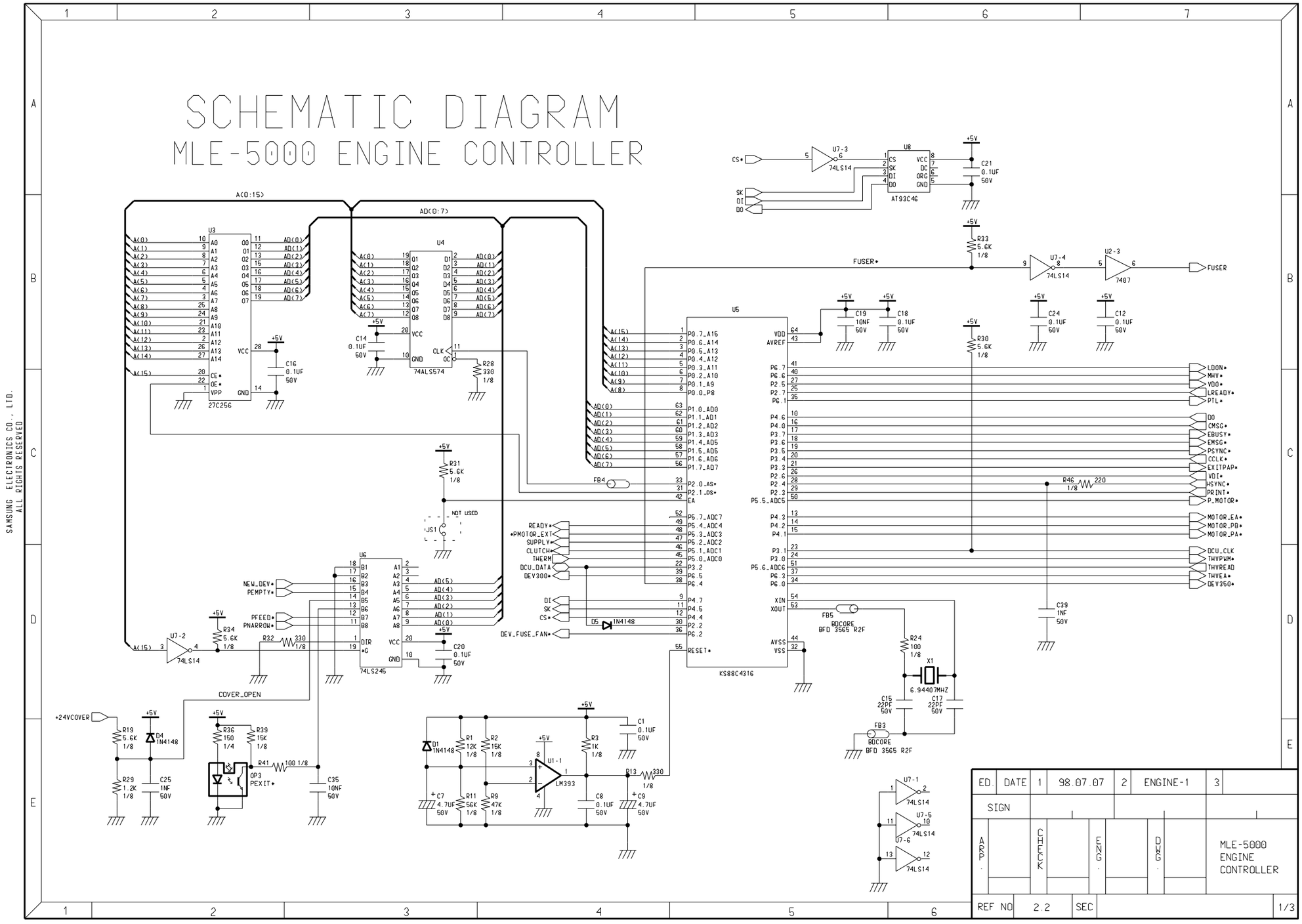
Controller (ML-5000G) 2/2



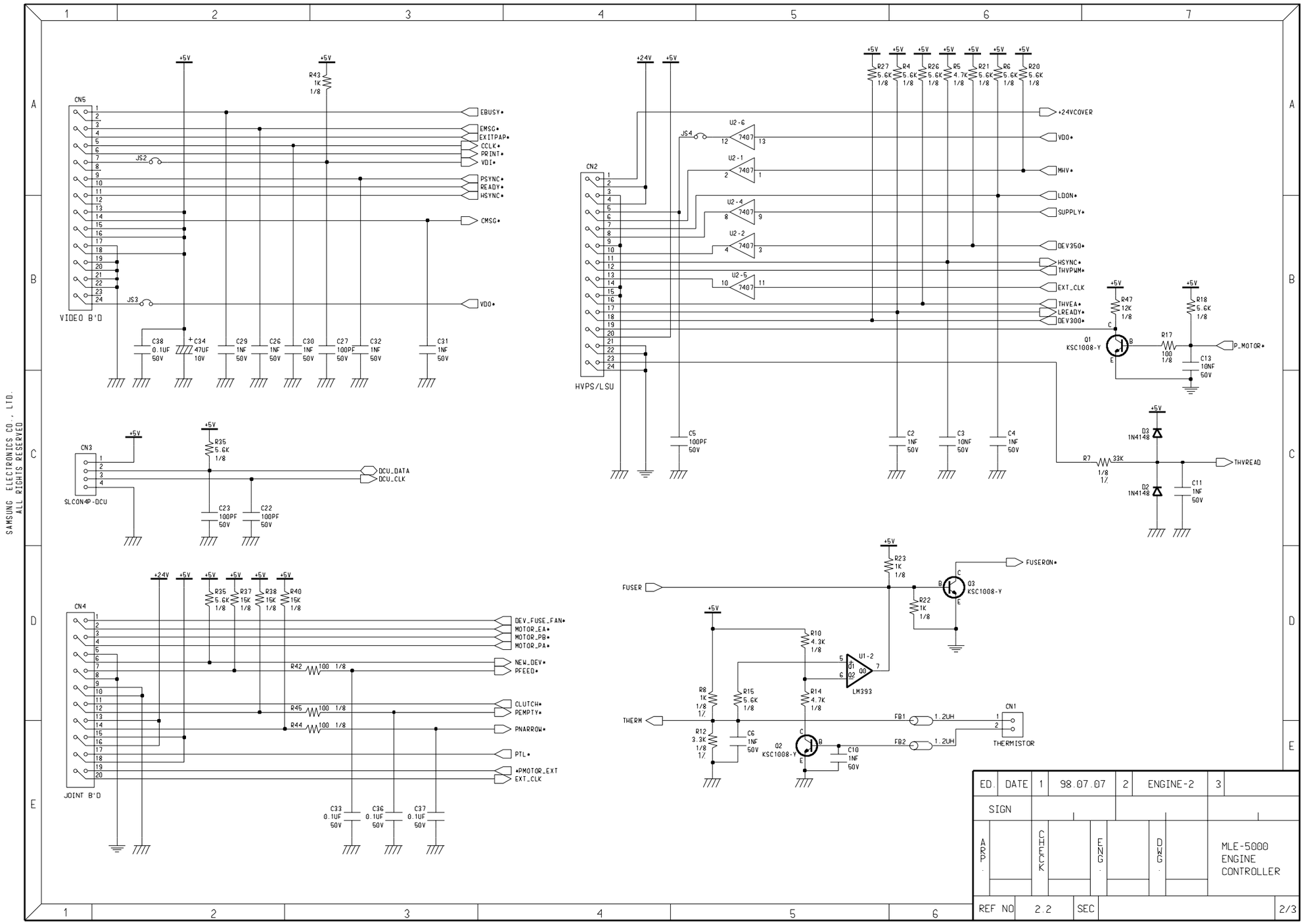
OPE Panel (ML-5000A/G)



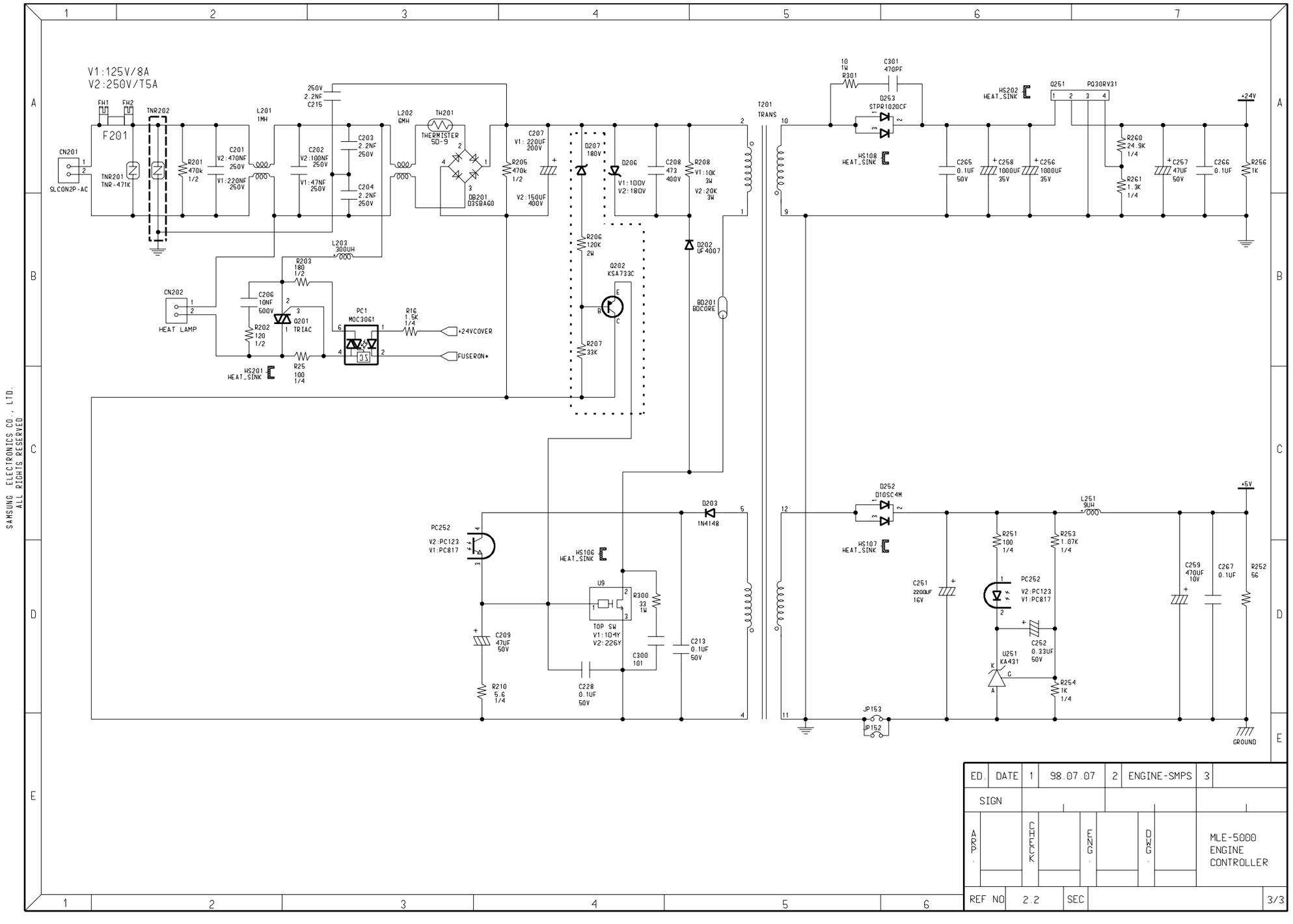
Engine (ML-5000A/G) 1/3



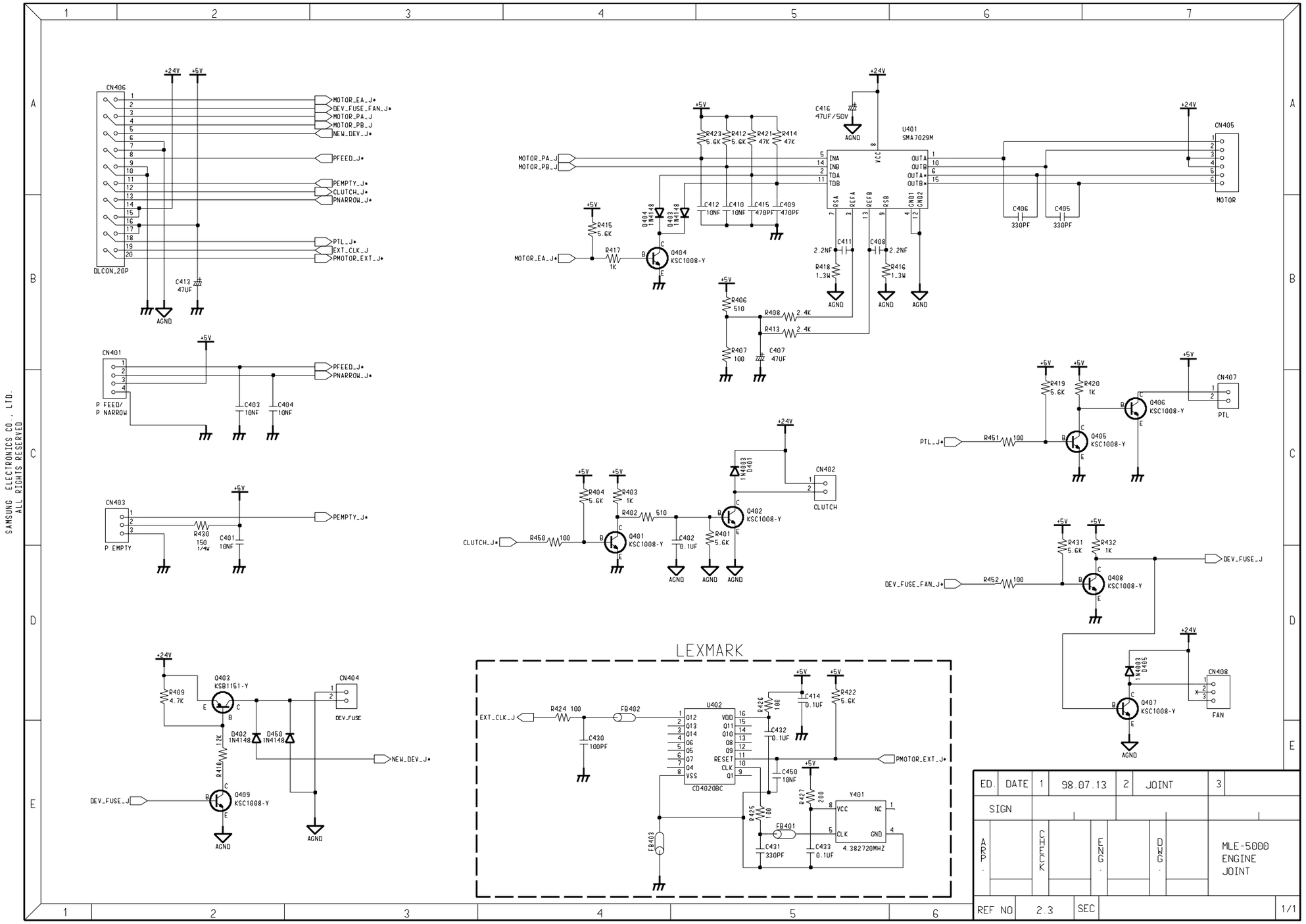
Engine (ML-5000A/G) 2/3



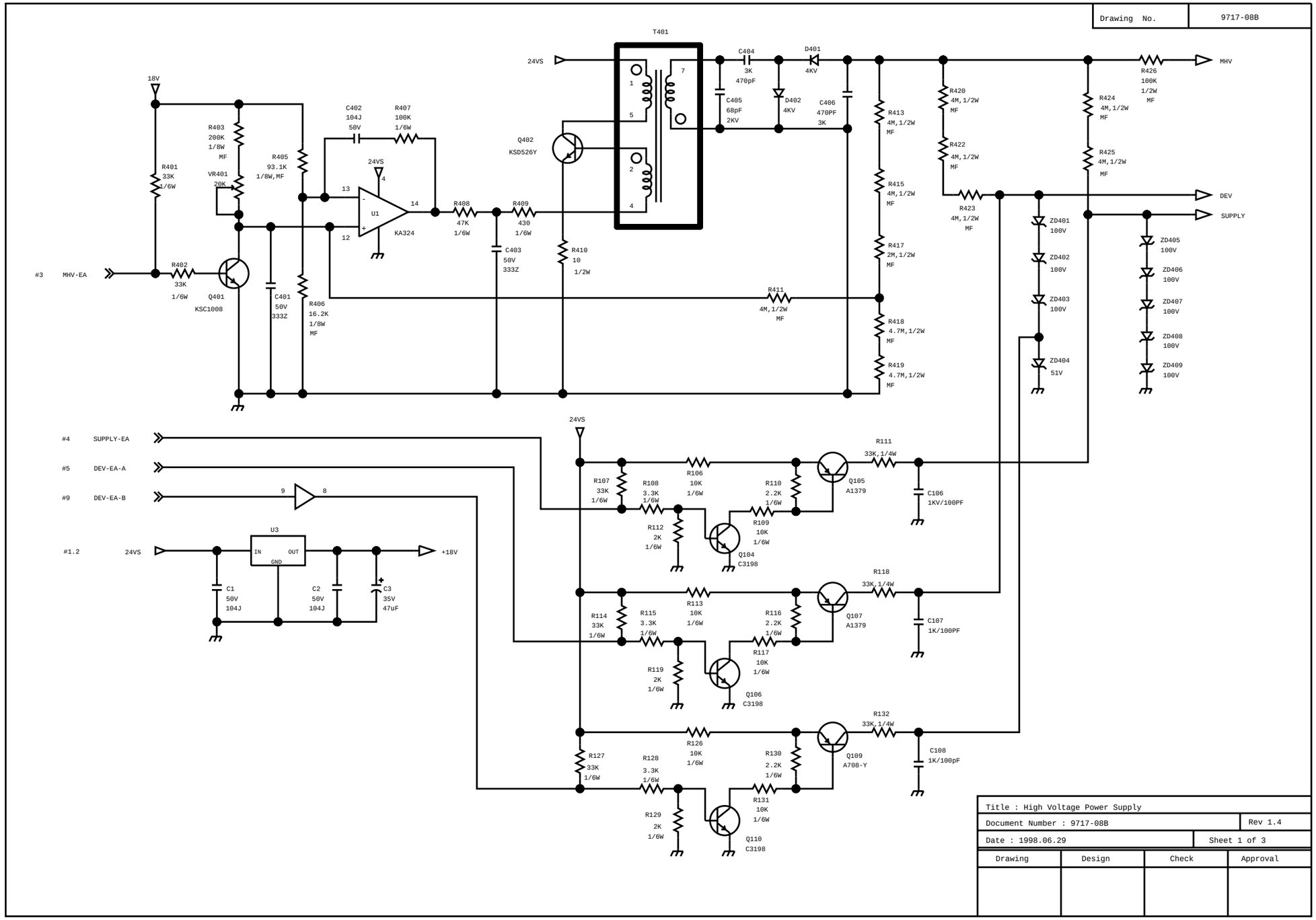
Engine (ML-5000A/G) 3/3



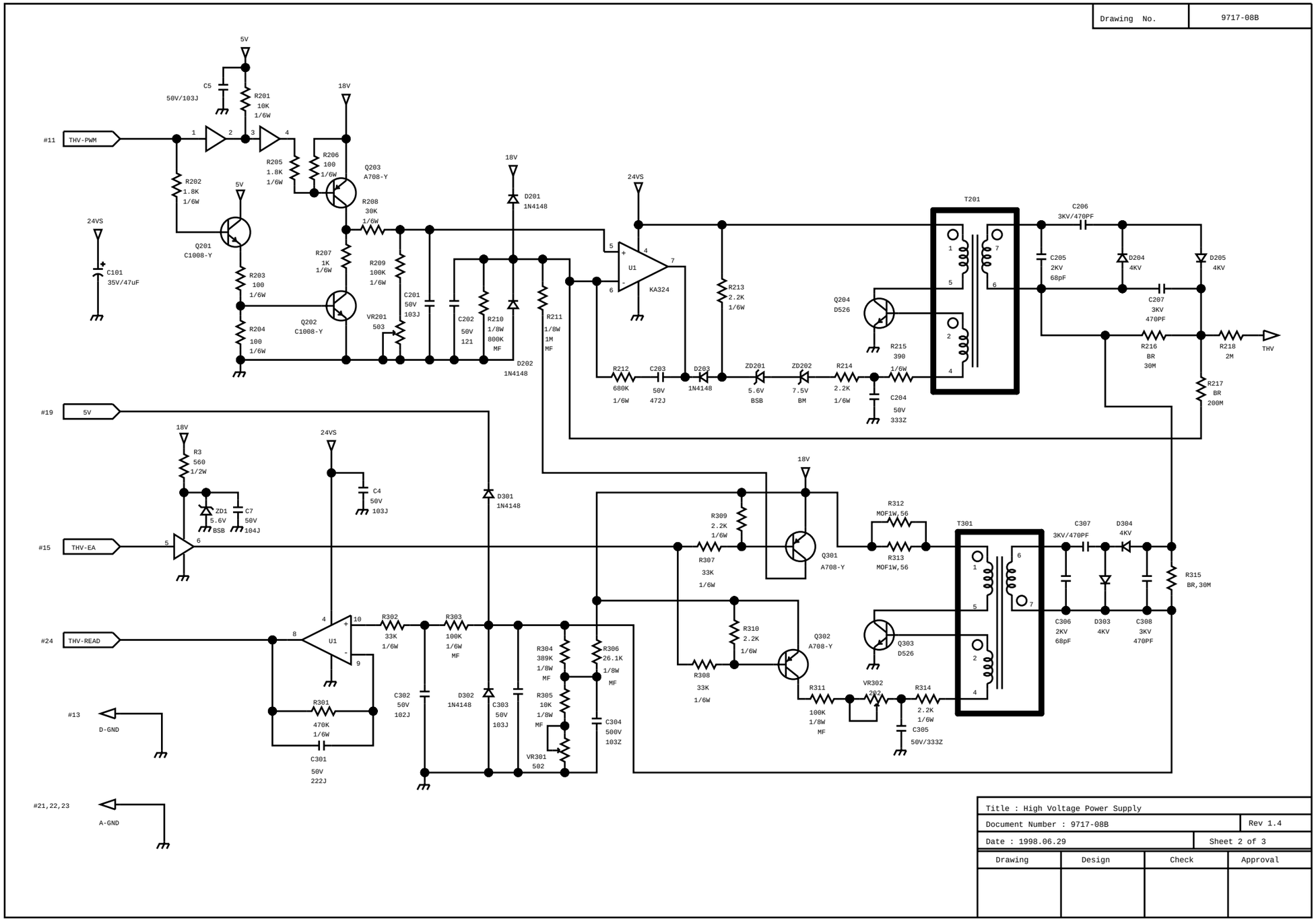
Joint Board (ML-5000A/G)



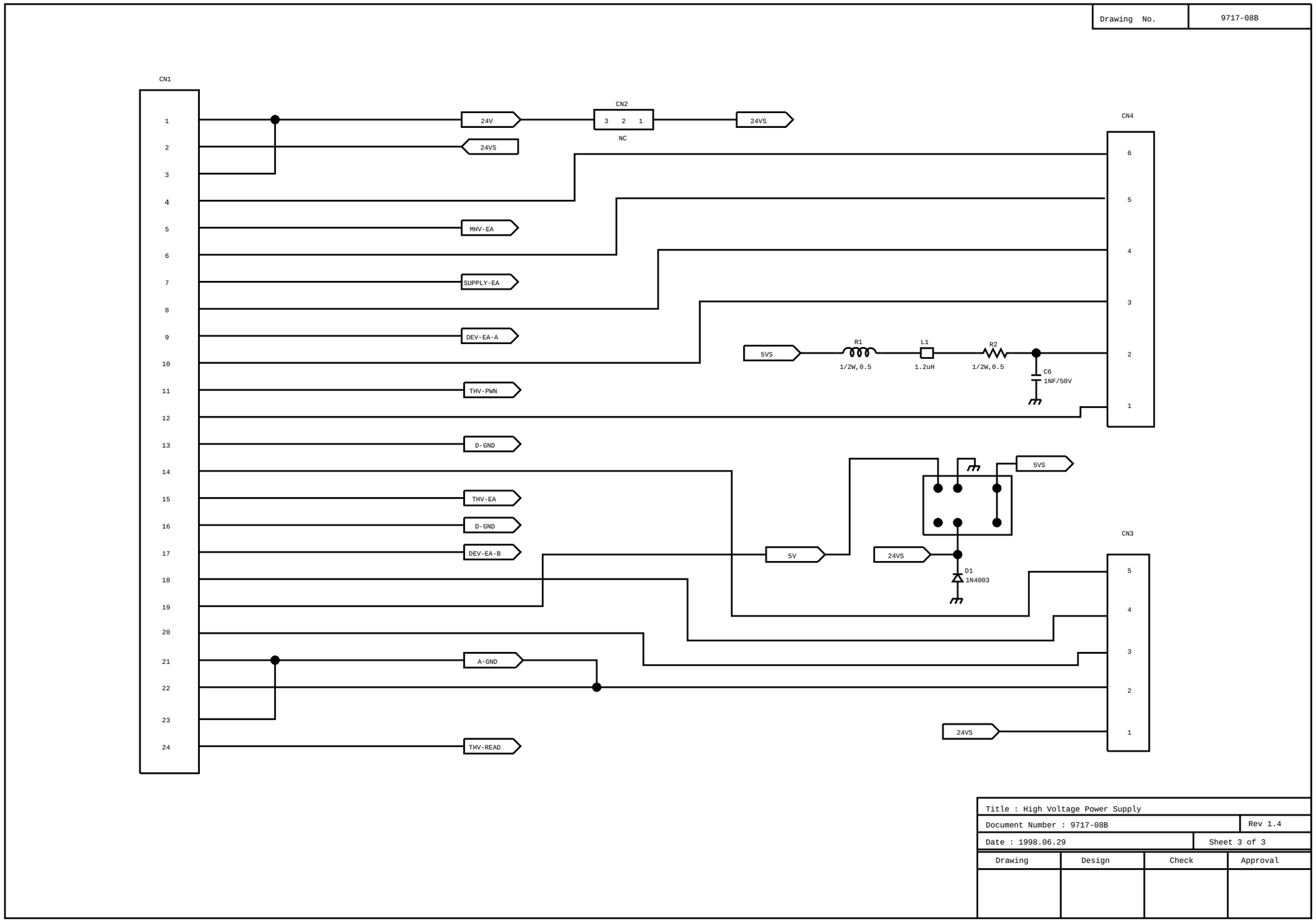
HVPS (ML-5000A/G) 1/3



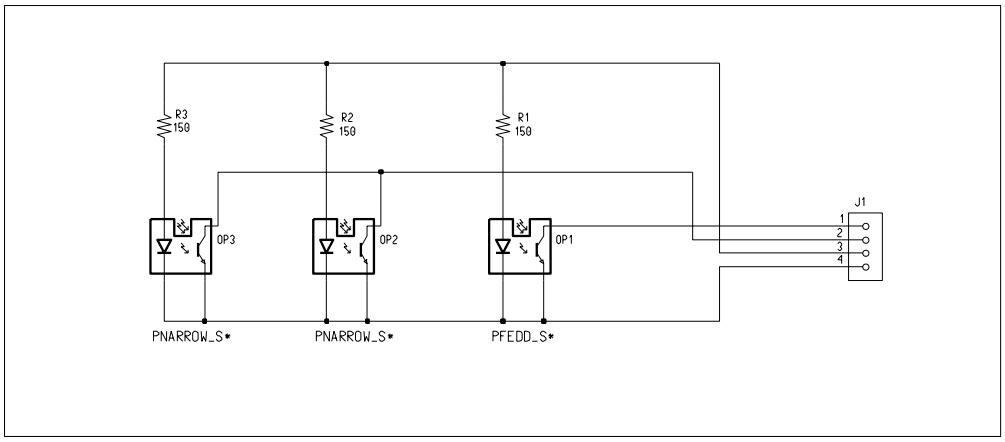
HVPS (ML-5000A/G) 2/3

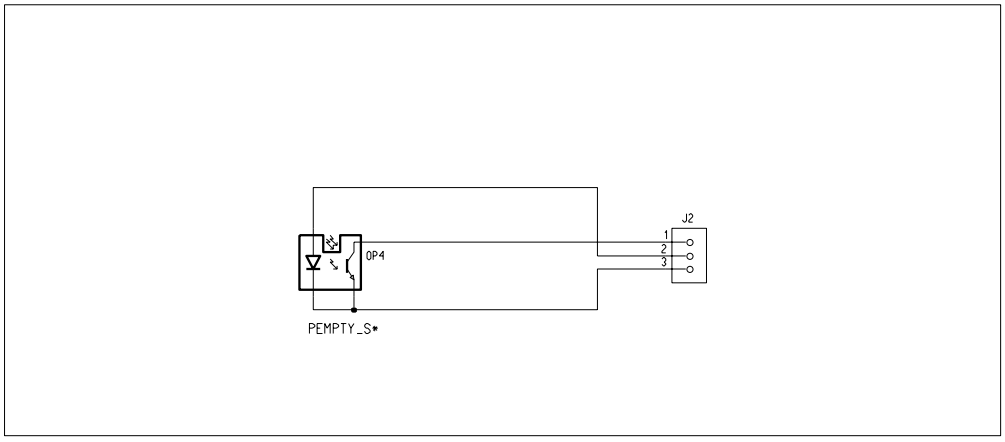


HVPS (ML-5000A/G) 3/3

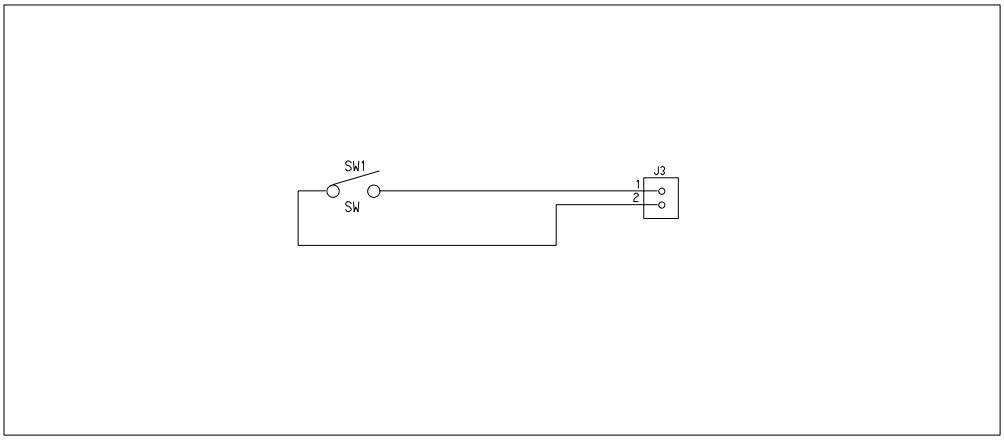
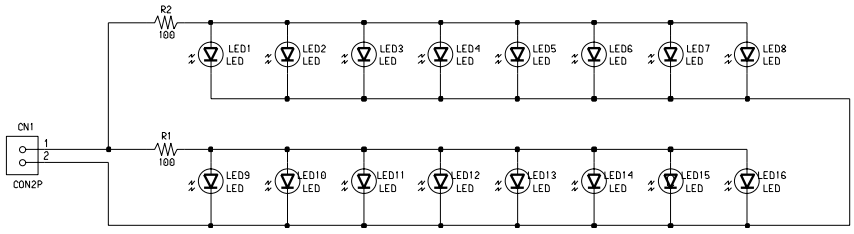


7-7 Sensor (ML-5000A/G)





7-8 Switch (ML-5000A/G)



7-9 PTL (ML-5000A/G)